CC8 PLANT GEOGRAPHY, ECOLOGY AND EVOLUTION (BOT-A-CC-4-8-TH, BOT-A-CC-4-8-P)

Lead Teacher: DR. ARGHYA KUMAR HAIT

DR. ARGHYA KUMAR HAIT

THEORETICAL **No of Classes Allotted – Three (3)/Week**

PLANT GEOGRAPHY

1. Phytogeographical regions:

1.1. Phytogeographical regions of India (Chatterjee 1960); 1.2. Dominant flora of Eastern Himalaya, Western Himalaya and Sunderban.

2. Endemism:

2.1 Endemic types and Factors; 2.2. Age & Area hypothesis and Epibiotic theory; 2.3. Endemism in Indian flora.

ECOLOGY

1. Preliminary idea on:

1.1. Habitat and Niche, 1.2. Ecotone and edge–effect, 1.3. Microclimate, 1.4. Ecads, ecotype and ecoclines, 1.5. Carrying capacity.

2. Community ecology:

2.1. Community- Characteristics and diversity, 2.2. Ecological succession –Primary and secondary, Seral stages (with reference to Hydrosere), autogenic and allogenic succession. 3.1. Plant indicators (metallophytes); 3.2. Phytoremediation.

4. Conservation of Biodiversity:

4.1. Level of Biodiversity: genetic, species & ecosystem diversity, 4.2. Biodiversity hot spots-criteria, Indian hotspots, 4.3. *In- situ* and *ex-situ* conservation, 4.4. Seed-banks, 4.5. Cryopreservation.

PROF. SUTAPA GUHA

THEORETICAL **No of Classes Allotted – One (1)/Week**

EVOLUTION

1.1 Introduction, 1.2. Theories of evolution: Natural selection, Group selection, Neutral theory of molecular evolution, 1.3. Phyletic gradualism, Punctuated equilibrium and Stasis 2.1 Brief idea on: Stabilizing directional, disruptive and sexual selection; Speciation: Sympatric and allopatric speciation; Coevolution, Adaptive radiation, Reproductive isolation 3.1. Simplified phylogeny of bacteria, algae, fungi, bryophyte, pteridophyte and gymnosperm, 3.2. Phylogenetic tree.

PRACTICAL **DR ARGHYA KUMAR HAIT and DR. ARKAGO MAJUMDAR**

ECOLOGY **No of Practical Classes Allotted – Two(2)/Week**

1. Study of community structure by quadrat method and determination of (i) Minimal size of the quadrat, (ii) Frequency, density and abundance of components (to be done during excursion/ field visit).

2. Comparative anatomical studies of leaves form polluted and less polluted areas.

3. Measurement of dissolved O_2 by azide modification of Winkler's method.

4. Comparison of free CO_2 from different sources.

CC 9 ECONOMIC BOTANY (BOT-A-CC-4-9-TH, BOT-A-CC-4-9-P)

Lead Teacher: DR. RUPAK KUMAR SENGUPTA

DR. RUPAK KUMAR SENGUPTA

THEORETICAL **No of Classes Allotted – Two (2)/Week**

1. Origin of cultivated crops: Concepts of centre of origin, their importance with reference to Vavilov's work. Examples of major plant introductions; crop domestication and loss of genetic diversity; evolution of new crops/ varieties, importance of germplasm diversity.
5. Spices: Listing of important spices, their family and part used.
7. Oil and fats: General description, classification, extraction, their uses and health implications of mustard, soybean, coconut (Botanical name, family and uses). Essential oils- general account, extraction methods, comparison with fatty oils and their uses.
8. Drug-yielding plants: Therapeutic and habit forming drugs with special reference to Cinchona, Digitalis, Papavar, Cannabis and Tobacco (morphology, processing, uses and health hazards).
9. Timber: general account with special reference to Sal and Teak.
10. Fibers: Cotton and Jute (Morphology, extraction and uses).

PROF. SANDHYA DUTTA

THEORETICAL **No of Classes Allotted – Two (2)/Week**

4. Sugar and starches: Morphology and processing of sugarcane, products and by products of sugarcane industry. Potato- morphology, propagation and uses.
2. Cereals: Rice and wheat (origin, morphology, processing and uses).
3. Legumes: Origin, morphology and uses of gram and mung bean. Importance to man and environment.
6. Beverages: Tea (morphology, processing and uses).

PRACTICAL **DR. RUPAK KUMAR SENGUPTA and PROF. SANDHYA DUTTA**

No of Practical Classes Allotted – Two(2)/Week

1. Cereals: Wheat (habit sketch, L.S./T.S. of grain, starch grains, micro-chemical tests); rice (habit sketch, study of paddy and grain, starch grains, micro-chemical tests)
2. Legume: Soybean, ground nut (habit, fruit, seed structure, micro-chemical tests)
3. Source of sugars and starches: Sugarcane (habit sketch; cane juice- micro-chemical tests); potato (habit sketch, tuber morphology, T.S. of tuber to show localization of starch grains, W.M. of starch grains, micro-chemical tests.
4. Tea- tea leaves, tests for tannin
5. Mustard- plant specimen, seeds, tests for fat in crushed seeds
6. Habit sketch of *Digitalis*, *Papaver* and *Cannabis*.
7. Sal, Teak- section of young stem.
8. Jute- specimen, transverse section of stem, tests for lignin on T.S. of stem and study of fibre following maceration technique.

CC 10 GENETICS (BOT-A-CC-4-10-TH, BOT-A-CC-4-10-P)

Lead Teacher : DR. SUJITA DATTA GHOSH

DR. SUJITA DATTA GHOSH

THEORETICAL

1. Introduction: Mendelian genetics and its extension.

2. Linkage, Crossing over and Gene Mapping:

2.4. Gene mapping with three point test cross, detection of middle gene in three point test cross, calculation of recombination frequencies, 2.5. Co-efficient of coincidence and interference, mapping function, 2.6. Problems on gene mapping, 2.7. **4.** Aneuploidy and Polyploidy: Types, examples, meiotic behaviour and importance of: 4.1.Aneuploidy, 4.2. Polyploid**7.** Structural organisation of Gene:

7.1. One Gene–one polypeptide concept, 7.2. Split gene, 7.3. Overlapping gene, 7.4. Repetitive DNA tandem

and interspersed, 7.5. Transposon (Ac-Ds system), 7.6. Homoeotic gene in plants (ABCE Quartet model of flowering).y, 4.3. Speciation and evolution through polyploidyMolecular mapping – ISH, FISH (brief idea).

PROF. SAYELA GUHA

2. Linkage, Crossing over and Gene Mapping:

2.1.Complete and incomplete linkage (example), linked gene does not assort independently (example), linkage group, 2.2. Crossing over, crossing over produces recombination (example), detection of crossing over (McClintock's experiment), and 2.3.Molecular mechanism of crossing over (Holliday model),

3. Epistasis and Polygenic inheritance in plants.

5. Chromosomal aberration: Types and meiotic behaviour of: 5.1. Deletion, 5.2. Duplication, 5.3. Translocation, and 5.4. Inversion.

6. Mutation :

6.1. Point mutation-Transition, Transversion and Frame shift mutation, 6.2. Molecular mechanisms (tautomerisation, alkylation, deamination, base analogue incorporation, dimerisation), 6.3. DNA repair (brief idea).

PRACTICAL DR. SUJITA DATTA GHOSH and PROF. SAYELA GUHA

GENETICS

1. Introduction to chromosome preparation: Pre-treatment, Fixation, Staining, Squash and Smear preparation, Preparation of permanent slides.

2. Determination of mitotic index and frequency of different mitotic stages in pre-fixed root tips of *Allium cepa*.

3. Study of mitotic chromosome: Metaphase chromosome preparation, free hand drawing under high power objective, drawing with drawing prism under oil immersion lens, determination of 2n number, and comment on chromosome morphology of the following specimens from root tips: *Allium cepa*, *Aloe vera*, *Lens esculenta*.

4. Study of chromosomal aberrations developed due to exposure to any two pollutants/ pesticides etc.
5. Study of meiotic chromosome: Smear preparation of meiotic cells, identification of different stages and free hand drawing of the following specimens from flower buds: *Allium cepa* and *Setcreasea* sp.
6. Identification from permanent slides : Meiosis – (i) normal stages (ii) abnormal stages – laggard, anaphase bridge, ring chromosome (*Rhoeo discolor*); Mitosis – (i) normal stages, (ii) abnormal stagesearly separation, late separation, multipolarity, sticky bridge, laggard, fragmentation, (ii) pollen mitosis.

SEC B PLANT BREEDING (BOT-A-SEC-B-4-3)

Lead Teacher: DR. SUJITA DATTA GHOSH

DR. SUJITA DATTA GHOSH

THEORETICAL **No of Classes Allotted – One (1)/Week**

1. Plant breeding**:** introduction and objectives, breeding systems- modes of reproduction in crop plants, important achievements and undesirable consequence of plant breeding.
2. Methods of crop improvement**:** Introduction- centres of origin and domestication of crop plants, plant genetics resources; acclimatization, selection methods- for self pollination, cross pollinated and vegetatively propagated plants, hybridization- for self, cross and vegetatively propagated plants, procedure, advantages and limitations.
3. Maintenance of germplasm, 3.1. Mass selections and Pure line selection, 3.2. Back cross

PROF. SAYELA GUHA

THEORETICAL **No of Classes Allotted – One (1)/Week**

4. Heterosis and hybrid seed production, 4.1. Male sterility and its use in plant breeding.
5. Inbreeding and inbreeding depression, effect of outcrossing- a very brief idea.
6. Molecular Breeding (use of DNA markers in plant breeding).
7. Role of mutations, polyploidy, distant hybridization and role of biotechnology in crop Improvements.

TRACKING ACADEMIC PROGRESSION THROUGH INTERNAL ASSESSMENT/EVALUATION

1. **METHOD : CLASS TEST – First during MID TERM and the second before the END TERM by each teacher concerned.**
2. **MENTOR – MENTEE APPROACH**
3. **Presentation of students in the Departmental STUDENTS SEMINAR.**