

AERO PALYNOLOGY AND POLLEN BORNE DISEASES

Bot. Sp-21

Credit Hours: 3(2+1)

THEORY

Introduction to the course:

The course aims to explain the science of Aero Palynology, to outline the main features of pollen and to show how these properties are used in various branches of science. It also aims to study the various pollen borne diseases.

Course Objectives:

The aim of the course is:

1. To understand the airborne pollen and spores.
2. To raise a level of identification of pollen and spores which cause allergy on sensitive individuals.
3. To study the common airborne pollen allergens and diseases.

Course Detail:

1. Aeropalynology:

1.1. Definition, the Ultrastructure and Morphology of Pollen and Spores.

2. Pollination Biology:

2.1. Critical Analysis and Morphographic Comparison of the Anemophilous, Zoophilous and Hydrophilous pollen.

2.2. Classification of Anemophilous pollen and their aerodynamic properties.

3. The Atmosphere and its Stratification.

4. Pollen Production and Aerial travels of pollen:

4.1. Transport Distances, Precipitation and Pollen Dispersal, Deposition and Re-deposition

4.2. Intercontinental and Intracontinental transport of pollen.

5. Stratification of pollen of various categories in the atmosphere:

5.1. Meteorological factors affecting their distribution (Wind, Temperature, Pollen Structure, Size, Humidity etc.)

5.2. Role of Pollen (upper atmosphere) in Cloud Formation and Precipitation.

6. Seasonal Distribution of spores and pollen at different levels in the atmosphere:

6.1. Pollen rain.

7. Pollen Deposition Traps:

7.1. By Direct Experiments

7.2. Short Term Trapping (Artificial Traps)

7.3. Long Term Trapping (Natural Or Manmade Traps)

7.4. Daily Pollen Count Techniques.

8. Pollen as Allergen Vector:

8.1. Causing Allergies and Asthma.

8.2. Mode of Action and Preventive Measures.

Practicals:

1. Preparation of pollen strew mount temporary aquas and permanent slides from freshly collected (or from herbarium) anthers to study the detailed morphographic structure of pollen including size, shape, aperture, ornamentation pattern etc. of the exine through standard procedures.
2. To build up reference pollen herbarium through standard established preparatory methods in form of permanent Strew mount slides representing plants of all seasons.

3. Capture Air borne pollen from various levels in the Atmosphere by using standard pollen deposition traps.
4. To count pollen per day in the atmosphere reflecting quantitative frequencies of various pollen types responsible for causing allergies and asthmas through standard techniques.
5. Visit any hospital or Allergy Centre to demonstrate before the pupils carrying out a specific pollen allergy tests.

Teaching-learning Strategies

1. Lectures
2. Group Discussion
3. Laboratory work
4. Seminar/ Workshop

Learning Outcome:

Students will be able to:

1. Explain the outlines of the science of Palynology.
2. Explain the contributions of the science of Aero Palynology to the following sciences: plant systematic, medicine, pharmacology, apiculture, archology, criminology and geology.
3. Choose a profession in area of palynology in the future.

Assessment Strategies:

1. Lecture Based Examination (Objective and Subjective)
2. Assignments
3. Class discussion
4. Quiz
5. Tests

Recommended Readings:

1. K. Faegri, P.E. Kaland and K. Krzywinski, (Latest Edition). Text book of Pollen Analysis, 4th edn. Wiley, Chichester.
2. R.G. Stanley, (Latest Edition). Pollen. Biology – Biochemistry –Management; in Linskens HF (ed): Berlin, Springer
3. A. Menzel, Estrella N: Plant phonological changes; in Walther et al (ed): Fingerprints of Climate Change. New York, Kluwer Academic/ Plenum Publishers.
4. Blackley CH: Experimental Researches on the Causes and Nature of Catarrhus aestivus (Hayfever or Hay-Asthma). London, Dawson's of Pall Mall, 1959 (original publication: London, Baillière, Tindall & Cox.
5. Aas K, Aberg N, Bachert C, Bergmann K, Bergmann R, Bonini S, Bousquet J, de Weck A, Farkas I, Hejdenberg K: European Allergy White Paper: Allergic Diseases as a Public Health Problem. The UCB Institute of Allergy, Brussels
6. Olga Ukhanova and Evgenia Bogomolova. Airborne Allergens. Komarov Botanical Institute of the Russian Academy of Sciences, St. Petersburg, Russia
7. Behrendt H, Frierichs KH, Kainka-Stänicke E, Darsow U, Becker WM, Tomingas R: Allergens and pollutants in the air – a complex interaction; in Ring J, Prybilla B (eds): New Trends in Allergy III. Berlin, Springer, 1991, pp 467–478.
8. Stephen T Holgate, Martin K. Church, David H. Broide, Fernando D Martinez. Allergy. Elsevier Health Sciences.
9. Maureen E. Lacey and Jonathan S. West.(latest edn.). The Air Spora: A manual for .catching and identifying airborne biological particles. Springer; 2007 edition

10. Maureen E. Lacey and Jonathan S. West. The Air Spora – A Manual for Catching and Identifying Airborne Biological Particles . Dordrecht, the Netherlands : Springer-Verlag Gmbh (<http://www.springer.com>) 2006 . 156pp.
11. Mikhail Sofiev and Karl-Christian Bergmann. (2013). Allergenic Pollen: A Review of the Production, Release, Distribution and Health Impacts. Springer; 2013 edition
12. Kainka-Stänicke E, Behrendt H, Friedrichs KH, Tomingas R: Surface alterations of pollen and spores by particulate air pollutants. J Hyg Environm Med 1989;188:516.
13. Knox RB: The pollen grain; in Johri BM (Latest ed): Embryology of Angiosperms. Berlin, Springer.
14. Linskens HF, Jorde W: Pollen as food and medicine – A review. Econ Bot 1997; 51:77– 78.
