



Department of Botany, University of Dhaka
Ph.D. Syllabus in Botany
for the session 2013-2014 Onward

Plant Taxonomy Paper I

Full Marks: 100

1. The scientific naming of plants

Forms of scientific names
Concept of ranks of taxa
Names of taxa
Citation of authorities
Publication
Typification
Priority and limitation of priority
Double citation
Names of cultivated plants
Names of sexual hybrids
Retention, choice and rejection of names and epithets
Names and Nyms

2. The practical naming of plants

Naming by comparison
Naming by means of keys
Bracketed key, Indented key
Use of keys
Good points in keys
Faults and limitations of keys
Short cuts and checks
Naming by an expert

3. (A) Formation of specific epithets

General information
Commemorative epithets
Descriptive epithets

Names of plant parts
Prefixes and suffixes

(B) Meaning of specific epithets

4. Flora and Vegetation

Objectives of flora and vegetation study
Standard inclusions in flora and vegetation study
Reconnaissance and planning aids for flora and vegetation study
Floral summary
Documentation
Floristic spectral analysis

5. Data accumulation and analysis

Introduction
Organization
Data accumulation
Data presentation and documentation
Drawings
Chromatographic data
Polygonal graphs and histograms
Hybrid index

6. Botanic gardens and Arboreta

Introduction
Basic objectives
History
Organization and development
Functions of the botanic garden

Reference

- Davis, P.H. and V.H. Heywood. 1963. Principles of Angiosperms Taxonomy. Oliver Boyd. Edinburgh & London.
- Hooker, J.D. 1837-1847. Flora of British India. Vols. 1-7.
- Jeffrey, C. 1986. An Introduction to plant taxonomy. 2nd edn. Cambridge Univ. Press.
- Khan, M.S. (ed.). 1973-2002. Flora of Bangladesh. Fasciole 1-51 BNH, BARC, Dhaka.
- Lawrence, G.H.M. 1968. Taxonomy of Vascular Plants. The Macmillan Company, New York.
- Radford, A.E., W.C. Dic Dickson, J.R. Masey & C.R. Bell. 1974. Vascular Plant Systematic. Harper & Raw Publishers NY.
- Stace, C.A. 1989. Plant Taxonomy & Biosystematics, 2nd Edward Arnold London.

Ph.D. Syllabus
Plant Taxonomy Paper II

Full Marks: 100

1. Anatomical evidence in Taxonomy:
Leaf anatomy; stomata, trichomes; petiole anatomy foliar venation; stem anatomy; stelar anatomy.
2. Reproductive Biology:
Population growth, size, density and carrying capacity; out breeding systems, asexual reproduction, in breeding systems, reproductive biology in relation to systematics; study methods; pollination types, mechanisms, vectors.
3. The application of natural products chemistry to taxonomy and phylogeny:
Steps to be followed in the solution of a chemotaxonomic problem; some natural products used in chemotaxonomic correlations; chromatography - basics and definitions; chemotaxonomy through protein analysis.
4. Habitats; Environmental relationships; biotic, abiotic factors; spatial relations, temporal relations, adaptive features. Life forms, diaspores types, fidelity, vitality, leaf size, developmental responses, heterotrophy.
5. Biodiversity and conservation:
Introduction to biodiversity conservation; world conservation strategies, conservation strategies for Bangladesh; International convention to Biodiversity; Methods of *ex situ* conservation; Biodiversity conservation issues and action plan for Bangladesh; The IUCN Red List Categories and threatened plants of Bangladesh.

Reference

- Arthur J. Eames, Laurence H. Mac-Daniels. 1950. An Introduction to Plant Anatomy. *American Midland Naturalist*, Vol. 43, No. 1 (Jan., 1950), p. 254
- Burkill, I.H. 1965. Chapters on the history of Botany in India. Govt. of India Press, Delhi.
- Charles B. Beck . 2005. An Introduction to Plant Structure and Development, University of Michigan, Ann Arbor, Hardback
- Cronquist, A. 1989. The evolution and classification of flowering plants. Honughton, Millin Co. Mass, USA
- Hunter, M.L. 1996. Fundamentals of conservation biology, Blackwell Science Publishers.
- Khan, M.S. 1991. Angiosperms. (In: (Islam, A.K.M. Nurul ed.) Two Centuries of plant studies in Bangladesh and Adjacent Regions. Asiatic Soc. Bangladesh, Dhaka.
- Khan, M.S., Rahman, M.M. and Ali, M.R. 2001. Red Data Book of vascular plants of Bangladesh, Bangladesh National Harbarium, Dhaka.
- Meffe, G. R. and Carroll, C.R. 1997. Principles of conservation biology (Second edn.) Sinauer Associates Inc. Publishers, Sunderland, Massachusetts.
- Prain, D. 1903. Bengal plants. Vols. 1-2, Calcutta.
- Radford, A.E., W.C. Dic Dickson, J.R. Masey, C.R. Bell & Vascular Plant Systematic. Harper & Raw Publishers NY.
- Stace, C.A. 1989. Plant Taxonomy & Biosystematics, 2nd Edward Ann

Department of Botany, D.U.
Syllabus for PhD. Course.
Session: 2010-2013
Course No. 701: (Advanced Mycology-1)

Time: 4:00 hours

Marks: 100

1. Introduction:
 - a. Molecular taxonomy and population genetics of fungi.
 - b. Fungal genomics: Introduction, genomic data, homology, comparative genomics between fungi and other organisms, fungal comparative genomics.
 - c. Genome organization in fungi.

2. Industrial mycology:
 - a. Commercial exploitation of fungal metabolites.
 - b. Major fermentation products,
 - c. Industrial production of citric acid, alcohol, and antibiotics.

1. Medical mycology: Cutaneous infections, subcutaneous infections, Systemic mycoses. Treatment of mycoses. Allergies.

2. Fungal biotechnology:
 - a. Biotechnological approaches in mushroom production,
 - b. Medicinal mushrooms: a rapidly developing area of biotechnology,
 - c. Mushroom nutraceuticals,
 - d. A protocol for quality mushroom nutraceuticals.

3. Agricultural biotechnology:
 - a. Control of fungal plant pathogens by mycofungicides,
 - b. Commercial production of fungal insecticides,
 - c. Arbuscular mycorrhizal fungi in plant disease control,
 - c. Commercialization of arbuscular mycorrhizal biofertilizer.

4. Myconano technology: a new and emerging science:
 - a. Concept of nanotechnology,
 - b. Biosynthesis of silver nanoparticles by fungus *Trichoderma reesei*,
 - c. Nanotechnology offers new insights into plant pathology,
 - d. Anti-microbial interior coating based on nanotechnology.

5. Fungal Genetic Engineering:
 - a. Principles and general methods of fungal genetic engineering,
 - b. Genetic engineering against fungal diseases,
 - c. Genetic engineering in plants for fungal resistance.

References

- Bennett, J.W. and L. L. Lasure. 1991. More Gene Manipulations in fungi. Academic Press. Orlando.
- Burnett, J.H. 1975. Mycogenetics. Wiley. London.
- Dilp, K., A. Arora, R.P. Elender and K.G. Mukerjii. 1992. Hand book of Applied Mycology. Vo. 4 Fungal Biotechnology. Marcel Dekker Inc.
- Dilip, K. A. 2004. Fungal biotechnology in agriculture, food and environment.
- Kendrik, B. 2002. The Fifth Kingdom. 3rd edn. Focus Publishing. R. Pullins Co.
- Raj,.M and P.D. Bridge 2009. Applied Mycology CABI Publishing.

Department of Botany, D.U.
Syllabus for M. Phil. Course.
Session: 2010-2013
Course No.601: Advanced Mycology

Time: 4:00 hours

Marks: 100

1. Introduction to systemic biology, phylogenetic relationship in fungi, systemics and fungal phylogeny, steps in a molecular phylogenetic study, characters used in phylogenetic analysis, uses of molecular phylogenesis, weakness of molecular characters.
2. Industrial mycology:
 - a. Fundamentals of fermentation technology,
 - b. Major fermentation products,
 - c. Industrial production of citric acid, alcohol, and antibiotics.
3. Ecology of the phylloplane:
 - a. Characteristic of leaf surface, saprophytes on the leaf surface, pathogen on leaf surface, microbiology on senescing leaves,
 - b. ecology of endophytic fungi associated with leaf litter decomposition.
4. Fungal biotechnology in agriculture:
 - a. Biotechnical approach to plant protection with fungi,
 - b. Molecular methods for identification of plant pathogenic fungi,
 - c. Application of molecular markers in epidemiology of plant pathogenic fungi.
5. Fungal biotechnology in food and feed:
 - a. Fungi in food technology
 - b. Role of fungi in fermented food
 - c. Molecular detection of food and feed.,
6. Environmental biotechnology:
 - a. Cellulose degradation by fungi,
 - b. The importance of wood decay fungi in forest ecosystem,
 - c. The biodegradation of lignocelluloses by white rot fungi,
 - d. Fungal degradation of explosives.
7. Myconano technology: a new and emerging science:
 - a. Concept of nanotechnology,
 - b. Biosynthesis of silver nanoparticles by fungus *Trichoderma reesei*,
 - c. Nanotechnology offers new insights into plant pathology,
 - d. Anti-microbial interior coating based on nanotechnology.

References:

- Blackman, J. P. 1981. Microbial Ecology of the Phylloplane. Academic Press. London subsidiary of Harcourt Brace Jovanovich.
- Dickinson, J.P. and T.F. Preece. (eds.). 1976. Microbiology of aerial plant surfaces. Academic Press. London & New York
- Dilip, K. A. 2004. Fungal biotechnology in agriculture, food and environment.
- Dilip, K., A. Arora, R.P. Elender and K.G Mukerjii. 1992. Hand book of Applied Mycology. Vo. 4 Fungal Biotechnology. Marcel Dekker Inc.
- Kendrik, B. 2002. The Fifth Kingdom. 3rd edn. Focus Publishing. R. Pullins Co.
- Preece, T. F. & Dickinson C. H. 1968. Ecology of leaf surface & Micro-organisms. Academic Press. London & New York
- Raj, M and P.D. Bridge 2009. Applied Mycology CABI Publishing

**Syllabus for M. Phil. Courses in Higher Cryptogams
(Session : 2003 onward)**

Paper - I

Total Marks: 100

1. Comparison of systems of classification in Bryophyta.
2. The taxonomy of Bryophyta.
3. Spore morphology and Bryophyte systematics.
4. The phylogeny and distribution of Musci.
5. Rhizoid and moss taxonomy.
6. Taxonomy and evolution of *Sphagnum*.
7. Experimental approach to Bryophyte taxonomy.
8. Chromosome morphology and Bryophyte systematics.
9. Structure and ecophysiological adaptation in Bryophytes.
10. Climatic adaptation of Bryophytes in relation to systematics.

References:

1. Bapna, K. R. & Kcchroo, P. 2000. Hepaticology in India. Vo-1 & 2. Published by Himanshu Publications, Udaipur, Delhi.
2. Chopra, R. S. 1975. Taxonomy of Indian mosses (an Introduction). Coun. Sci. Ind. Res. New Delhi, India.
3. Clarke, G. C. S. & Duckett, J. G. Bryophyte Systematics. 1979. Published for the Systematics association and the British Bryological Society. By Academic press London, New York, Toronto, San Francisco.
4. Crum, H. A. and L. E. Anderson 1981 Mosses of Eastern North America. 1 & 2. Columb. Univ. Press. New York.
5. Dixon, H. N. 1896 (Reprint 1970) The students hand book of British mosses. Wheldon & Wesley, LTD.
6. Gangulee, H. C. 1969-1972. Mosses of Eastern India and adjacent regions. Vol.1. Calcutta, India.
7. Gangulee, H. C. 1974-1977. Mosses of Eastern India and adjacent regions. Vol.2. Calcutta, India.
8. Gangulee, H. C. 1978-1980. Mosses of Eastern India and adjacent regions. Vol.3. Calcutta, India.
9. Kashyap, S. R. 1929. Liverworts of the Western Himalayas and the Panjab plain, Part-1. The University of Panjab, Lahore.
10. Kashyap, S. R. 1932. Liverworts of the Western Himalayas and the Panjab plain, Part-2. The University of Panjab, Lahore.
11. Parihar, N. S. 1973. An introduction to Embryophyta. Vol. 1, Central book Depot. Allahabad.
12. Scagel et al. 1967. An evolutionary survey of the plant kingdom, Wadsworth publishing Co. Inc. Belmont California.
13. Vohra, J. N. Leskeineae (Musci) of The Himalayas. 1983. Published by Botanical Survey of India, Navana Printing Works (P.) Limited, Calcutta 700013.

Department of Botany
University of Dhaka
Syllabus for M. Phil. Courses in Higher Cryptogams
(Session : 2003 onward)

Paper - II

Total Marks: 100

1. Ecology of ferns:
 - i) Environmental classification of Fern diversity.
 - ii) Tropical Mesic environment.
 - iii) Tropical Alpine environment.
 - iv) Tropical Xeric environment.
 - v) Temperate environment.

2. The Cytogenetics of Ferns:
 - i) Chromosome number and morphology.
 - ii) Polyploidy:- (a) Origin of Polyploidy (b) Polyploidy in Homosporous and Heterosporous Ferns. (c) Geographical distribution of Polyploids.
 - iii) Cytogenetic analysis of species complex:- (a) Genome analysis (b) Analysis of some species complex.
 - iv) Apospory, Apogamy and Apomyxis.
 - v) Hybridization.

3. The Genetics and Reproductive Biology of Ferns;:
 - i) Early genetic studies in Ferns.
 - ii) The nature of Fern breeding system.
 - iii) Genetic variability in Fern population.
 - iv) Storage and maintenance of Genetic variability of Fern populations.
 - v) In-situ Bioassay system of Environmental mutagens.
 - vi) Mutagenesis.

4. Aseptic techniques for *in vitro* culture of plant organs.

5. Nutritional components of tissue culture media.

6. Culture of Fern gametophyte
 - i). The choice of species.
 - ii) Spore collection and storage.
 - iii) Culture media.
 - iv) Spore sterilization.
 - v) Spore sowing density.
 - vi) Culture conditions.
 - vii) Germination induction.
 - viii) Sampling and replication.
 - ix) Callus initiation.

7. Basic technique for *in vitro* culture of ferns .

8. Experimental aspects of Fern Ecology:
 - i) The Ecology and experimental problem.
 - ii) Ecology and Geographical range.

- iii) Spore production, dispersal and viability.
- iv) Spore deposition.
- v) Spore germination and establishment.
- vi) Prothallial development.
- vii) Ecological aspects of sexual maturity and fertilization.
- viii) Tolerance of desiccating conditions.

References:

1. Beddome, R. H. 1892. Hand book to the ferns of British India, Ceylon and the Malay Peninsula. Bombay: Thacker & Co., Lim.; Madras: Higgingbotham & Co., London: W. Thacker & Co.
2. Bhojwani, S. S. and Razdan, M. K. 1985. Plant tissue culture, Theory and Practice. Elsevier. Publ. Netherland
3. Dodds, J.H. & Roberts, L.W. 1982. Experiment in Plant Tissue culture. Cambridge University Press. Cambridge, London.
4. Dyer, A. F. The experimental Biology of Ferns. 1979. By Academic press London, New York, San Francisco.
5. Eames, A. J. 1936 (1964). Morphology of vascular plants (Lower groups). Tata Mc. Graw-Hill publishing co. Ltd. New Delhi.
6. Parihar, N. S. 1973. An introduction to Embryophyta. Vol. 2, Central book Depot. Allahabad.
7. Rashid, A. 1976. (Reprint in 1991). An introduction to Pteridophyta. Vikas Publishing House , Pvt. Ltd. Masjid Road, Jangpura, New Delhi, India.
8. Scagel et al. 1967. An evolutionary survey of the plant kingdom, Wadsworth publishing Co. Inc. Belmont California.
9. Sharma, O. P. 1981. Pteridophyta: A new look. Pragati Prakashani, Meerut, India.