



MCC Department of Botany

Paper 13a PLANT ANATOMY AND EMBRYOLOGY

M. Sc. va. (Candidates admitted from the academic year 2008-2009)

Core Theory

Paper 13a PLANT ANATOMY AND EMBRYOLOGY

M. Sc. va. (Candidates admitted from the academic year 2008-2009)

Core Theory

Plant Anatomy

UNIT I

Cell wall components, microscopic structures, pits and its ultrastructure. Meristems - apical, lateral and intercalary. Organisation of shoot and root apex. Vascular cambium and cork cambium.

Key words: Plasmodesmata, ramiform pits, fusiform initials, ray initials, storied cambium, non-storied cambium, cambial zone

UNIT II

Xylem - Primary and Secondary. Wood technology - Ultrastructure, diagnostic features, some commercial wood (eg. Teak, Vengai, Padok, Mangium and Kongu). - External features: Colour, hardness, odour, lustre, texture. Internal features: Porous wood, non-porous wood. Heart wood and Sap wood. Phloem - Primary and Secondary. Cell types, ontogeny of sieve element, internal and external phloem

Key words: Perforation plate, sieve plate, P-protein, heart wood, sap wood, tylosis,

UNIT III

Anomalous secondary growth in stem and root in dicots and monocots. Use of Wood as timber, plywood, pulp and paper. Dendrochronology Leaf-Development and Structure based on symmetry, environment and photosynthetic types. Stomata, Senescence and Abscission.

Key words: Included phloem, conjunctive parenchyma, Kranz anatomy.

Embryology

UNIT IV

Anther - Ontogeny and ultrastructure. Structure and function of tapetum. Male gametophyte - Sperm. Ovule - types, integument, female gametophyte. Self incompatibility. Fertilization - Recent progress in *in vitro* fertilization.

Key words : Endothecium, endothelium, heterofertilization, obturator.

Palynology

UNIT - V

Definition and scope of palynology. Difference between Pollen and Spore. Acetolysis method of pollen preparation. Sporoderm - Exine and Intine development and ultrastructure. Exineless Pollen. Pollen and spore morphology. Shapes and size of pollen. Pollen threads Sporopollenin, Non-sporopollenin and Viscin).

Applied Palynology:

A brief account on Melitopalynology, Aeropalynology, Iatropalynology, Pharmacopalynology, Forensic Palynology, Copropalynology, Paleopalynology and Palynotaxonomy.

Key words : Sporoderm, sporopollenin, oncus, viscin thread, pollen kit, harmomegathy, pollen diagram, pollen calender.

Pollination Biology

UNIT VI

Cleistogamy and chasmogamy. Autogamy and allogamy. Contrivances for cross pollination. Abiotic pollination and biotic pollination.

Primary and secondary attractants. Nectaries: Floral (*Catharanthus*, *Bauhinia*) Extrafloral (*Ricinus*, *Albezzia*).

Co-evolution: Pollination in *Ficus*, *Yucca* and *Ophrys*.

Bee, butterfly, and moth pollinated flowers.

Key words : Protogyny, protandry, heterostyly, herkogamy, pre-nectar, sub-glandular tissue.

Suggested Reading

Plant Anatomy

CARLQUIST, S. 1965. Comparative Plant Anatomy. Holt Rinehart and Winston, New York. U.S.A.

CHOWDHURY, K.A. and GHOSH, S.S. 1958. Indian woods Vol. I and II. Their identification, properties and uses.

CLOWS, F.A.L. 1961. Apical Meristems. Blackwell Scientific Publications, London.

CUTTER, E. 1978. Plant Anatomy. Part I and II. Edward Arnold, London.

DORMER, K.J. 1972. Shoot Organization in Vascular Plants. Chapman and Hall Ltd., London.

EAMES, A.J. and L.H. MACDANIELS. 1972. An Introduction to Plant Anatomy. Tata McGraw - Hill Publishing Company Ltd., New Delhi.

ESAU, K. 1977. Anatomy of seed plants. John Willey and Sons. USA.

FAHN, A. 1989. Plant Anatomy. Pergamon Press, Oxford, London.

FOSTER, A.S. 1949. Practical Plant Anatomy. D.van Nostard Compay, Inc., California, U.S.A.

JANE, F.W. 1956. The structure of wood. Adam and Charles Black, London.

MAUSETH, J.D. 1988. Plant Anatomy. The Benjamin/Cummings Pub.Company, Inc. USA.

PHILIPSON, W.R., M.W. JOSEPHINE AND B.G. BUTTERFIELD. 1971. Vascular Cambium. Chapman and Hall Ltd., London.

RAMESH RAO, K. AND K.B.S. JUNEJA, 1971. A handbook for field identification of fifty important timbers of India. Forest Research Institute, Dehra Dun.

Palynology

ERDTMAN, G. 1954. An Introduction to Pollen Analysis. Chronica Botanica, Waltham, Mass. U.S.A.

FAEGRI, K. AND J. IVERSON. 1989. Text Book of Pollen Analysis. John Wiley and Sons, New York.

IWANAMI, Y.; T. SASAKUMA AND Y. YAMADA. 1988. Pollen : Illustrations and Scanning Electronmicrographs. Springer-Verlag, Berlin.

LINSKSENS, R.G. AND R.G. STANLEY. 1974. Pollen. Springer - Verlag, Berlin.

MOORE, P.D. and J.H. WEBB. 1978. An Illustrated Guide to Pollen Analysis. Hodder and Stoughton, London.

NAIR, P.K.K. 1985. Essentials of palynology. Today and Tomorrow Printers and Publishers, New Delhi.

Embryology

BHOJWANI, S.S. AND S.P. BHATNAGAR. 1981. The embryology of Angiosperms. Vikas Publishing House Pvt Ltd. New Delhi.

JOHRI, B.M. 1984. Embryology of Angiosperms. Spriger-Verlag, Berlin

MAHESWARI, P. 1950. Embryology of Angiosperms. McGraw Hill Book Co. Inc. New York.

Pollination Biology

BARTH, F.G. 1985. Insects and Flowers. George Allen and Onwin, Sydney.

FAEGRI, K. and VAN DER PIJL. 1979. The Principle of Pollination Ecology. Peragmon Press, New York.