Subject Code : P8BO6

ANATOMY, EMBRYOLOGY AND MORPHOGENESIS

Unit-I: ANATOMY

General account and theories of organisation of apical meristems of shoot apex and root apex, quiescent centre. Structural diversity and phylogenetic trends of specialization of xylem and phloem. Cambium - origin - cellular structure, cell division, stories and non-storied types. Cambium in budding and grafting - wound healing role. Trichomes, periderm and lenticels.

Unit-II: ANATOMY

Anatomical characteristics and vascular differentiation in primary and secondary structure of root and stem in Dicot and Monocot. Origin of lateral roots - Root stem transition - Anatomy of Dicot and Monocot leaves. Leaf abscission, stomatal types, nodal anatomy, petiole anatomy, vascularisation of flower and seedling.

Unit-III: EMBRYOLOGY

Microsporangium - Microsporogenesis, Microspores - arrangement - morphology - ultrastructure - Microgametogenesis - Pollen - Stigma - Incompatibiligy - Methods to overcome incompatibility - Megasporangium - Megagametogenesis - Female gametophyte - Monosporic - Bisporic and Tetrasporic - Nutrition of embryo sac and fertilization

Unit-IV: EMBRYOLOGY

Endosperm - Types - Endosperm haustoria - Cytology and physiology of endosperms, functions of endosperms - Embryo development in Dicot and Monocot, Nutrition of embryo - Polyembryony - Causes, Apomixis - Causes, Apospory - Their role in plant improvement programmes and seed development.

Unit-V: MORPHOGENESIS

Definition - Morphogenesis and its relation to morphology - Turing's diffusion reaction theory - Morphogenetic factors - growth regulators - genetic and environment - polarity.

Molecular basis of morphogenesis - Cytosol and cytoskeleton, microtubules and microfilaments - Cellular level morphogenesis - Nuclear transplantation experiments with *Acetabularia* - Sach's and Errer's laws - Asymmetric divisions and their significance. Morphogenesis at tissue level - Differentiation, dedifferentiation and redifferentiation of vascular tissue *in vivo, in vitro* and in wounds. Plant galls and their importance in morphogenesis.

References

Anatomy

- Clowers, F. A. L. (1961). Apical Meristems. Blackwell Scientific Publication, Oxford.
- Cutter, E. G. (1978). Plant Anatomy. Edward Arnold Publishers Ltd., London.
- Easu, K. (1953). Plant Anatomy. John Wiley & Sons Inc., New York.
- Fahn, A. (1989). Plant Anatomy. Maxwell Pvt. Ltd., Singapore.
- Metcalfe and Chalk (1950). Anatomy of the Dicotyledons and Monocotyledons. Vol. I and II. Clarendon Press, Oxford, UK.
- Pandey, B. P. (1989). Plant Anatomy. S. Chand and Co. Ltd., New Delhi.
- Singh, V., Pande, P. C. and Jain, D. K. (1987). Anatomy of Seed Plants. Rastogi Publications, Meerut.

Embryology

- Agarwal, S. B. (1990). Embryology of Angiosperms - a fundamental approach. Sahitya Bhawan, Agra.
- Bhojwani, S. S. and Bhatnagar, S. P. (1981). Embryology of Angiosperms. Vikas Publishing House Pvt. Ltd., New Delhi.
- Dwivedi, J. N. (1998). Embryology of Angiosperms. Rastogi and Co., Meerut.
- Maheswari, P. (1963). An Introduction to Embryology of Angiosperms. International Society of Plant Morphologies, University of Delhi.
- Raghavan, V. (1976). Experimental Embryogenesis in Vascular Plants. Academic Press, London.

Morphogenesis

- Bard, J. (1990). Morphogenesis. Cambridge University Press, London.
- Bonner, J. T. (1965). Morphogenesis. Oxford & IBH Publications, Bombay.
- Brouder, L. W. (1986). Development Order: A Comprehensive Treatise. Vol.2. The Cellular Basis of Morphogenesis. Plenum Press, New York.
- Bryant, J. A. and Francis, D. (1985). The Cell Division Cycle in Plants. Cambridge University Press, London.
- Burgess, J. (1985). An Introduction to Plant Cell Development. Cambridge University Press, London.
- Ebert, J. D. *et al.* (1970). Interacting Systems in Development. Holt, Reinhart & Win Inc., New York.
- Murphy, T. M. and Thompson, W. F. (1988). Molecular Plant Development. Prentice Hall of India Pvt. Ltd., New Jersey.