Exploring Medicinal Plants: From Cultivation to Applications

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Exploring Medicinal Plants: From Cultivation to Applications	**2**	**0**	**0**	**2**	**Class XII**	**NIL**

Learning Objectives:

The learning objectives of this course are as follows:

- To learn various methods of propagating medicinal plants, such as seed germination, stem cuttings, and division.
- To develop the ability to observe and document macroscopic characteristics of herbal materials.
- To learn the microscopic techniques for examination of plant materials.
- To learn the different methods used in extracting bioactive compounds from medicinal plants and the factors to be considered in choosing the appropriate method.
- To conduct phytochemical screening tests to detect the presence of various compounds in medicinal plant extracts.
- To analyze the separated compounds from medicinal plant extracts using Thin Layer Chromatography (TLC).

Learning Outcomes:

By studying this course, students will be able to:

- acquire knowledge of proper care and maintenance of medicinal plants during cultivation.
- learn to identify and describe variations in size, color, odor, and surface texture among different plant specimens.
- acquire the skills to observe and count stomata, the tiny openings on leaf surfaces.
- perform commonly used phytochemical screening methods such as the alkaloid test, glycoside test, steroid and triterpenoid test, tannin test, flavonoid test, and phenol test and interpret the results
- use Thin Layer Chromatography (TLC) to separate compounds from a medicinal plant extract and analyze the separated compounds.
- evaluate the current research and developments in the field of medicinal plants.

PRACTICAL **(60 hours)**

1. Cultivate and monitor medicinal plants to learn propagation techniques.
2. Conduct macroscopic examination of herbal material based on their size, color, odor, and surface texture.
3. Perform microscopic examination to determine stomatal number and index.
4. Conduct microscopic examination to measure the size of calcium oxalate crystals.
5. Determine the moisture content of crude medicinal plant extract.
6. Determine the alcohol-soluble extractive value of medicinal plant extract.
7. Determine the water-soluble extractive value of medicinal plant extract.
8. Perform solvent extraction of bioactive compounds from medicinal plants.
9. Perform phytochemical screening tests for alkaloids, glycosides, tannins, flavonoids, and phenols.
10. Conduct fractionation and purification using chromatographic technique (TLC) to separate compounds from medicinal plant extracts.
11. Visit industries/institutes and prepare a report based on your observations and learning.

Essential/ Recommended Readings:

1. Harborne J. B. (1998) Phytochemical Methods: A guide to modern techniques for plant analysis. Publisher: Champman and Hall.
2. N. Raaman (2006) Phytochemical Techniques. Publisher: New India Publishing Agency. ISBN: 9788189422301, 8189422308.
3. Joseph Sherma, Monika Waksmundzka-Hajnos, Teresa Kowalska (2008) Thin Layer Chromatography in Phytochemistry. Publisher: CRC Press. ISBN: 9781420046786, 1420046780.
4. Alex Gardner (2014) DIY Herbal Gardening. Publisher: CreateSpace Independent Publishing Platform. ISBN: 9781505672473, 1505672473.
5. L. D. Kapoor (2001) Handbook of Ayurvedic Medicinal Plants. Publisher: Taylor & Francis. ISBN: 9780849329296, 0849329299.

6. Raphael and Ikan (2013) "Natural Products: A Laboratory Guide" by Publisher: Academic Press ISBN 978-0123705518.
7. Nava and Dayan (2011) Formulation, Development and Production of Herbal Personal Care Products. Publisher: John Wiley and Sons Inc. ISBN-10: 047048408X.
8. Sanjay Sharma (2015) Current status of herbal product: Regulatory overview. J Pharm Bioallied Sci. 7(4): 293–296. doi: 10.4103/0975-7406.168030
9. WHO (1998) Quality control methods for medicinal plant materials. WHO Library Cataloguing-in-Publication Data. ISBN 978 92 4 150073 9.

Suggestive Reading:

1. Mohar Singh, Nikhil Malhotra (2021) Himalayan Medicinal Plants: Advances in Botany, Production & Research. Publisher: Elsevier Science, ISBN: 9780128234303, 012823430X.
2. H. S. Puri (2003) Rasayana: Ayurvedic Herbs for Longevity and Rejuvenation (Traditional Herbal Medicines for Modern Times Book 2). Publisher: CRC Press. ISBN-13: 978-0415284899.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.