MANGALORE UNIVERSITY

Department of Applied Botany

MSc Botany

BOS508 Phytochemical methods

Course outcome:

- Introduces them to various kinds of phytochemicals in plants
- Detailed methods of extraction and isolation will help them in higher studies
- A unit on evaluation of phytochemicals for various disorders also is useful in higher studies
- The chapter on herbal drugs helps to understand the significance of our traditional herbal practices
- Together, all these will help them to get jobs in pharmaceutical or such other companies or take up further studies in drug development

Teaching hours – 10/unit

Unit I

Scope of phytochemistry, plants as source of chemical compounds, primary and secondary metabolites. Important source of carbohydrates, proteins, lipids, phenolics, flavonoids, pigments, alkaloids, volatile oils, terpenes, resins.

Unit II

Extraction, isolation and purification of phytochemicals

Selection of plant samples, processing and storage of samples for extraction.

Extraction methods- infusion, decoction, digestion, maceration, percolation, solvent extraction, fluid extraction, ultrasound, microwave assisted extraction, advantage and disadvantage involved in each method.

Isolation of selected primary and secondary metabolites – amino acids, proteins and carbohydrate. Phenolics, flavonoids, alkaloids, lipids, oils, terpenes and saponins.

Purification techniques for primary and secondary metabolites – solvent-solvent fractionation and chromatography techniques - HPTLC, silica gel column (normal and reverse), ion exchange, size exclusion

Unit III

Characterisation and analysis of phytochemicals

Preliminary, qualitative and quantitative techniques – paper chromatography, thin layer chromatography, Column Chromatography – HPLC, GC (qualitative and quantitative)

Colour reactions for amino acids, sugars, phenolics, flavonoids, alkaloids, terpenes, saponins, oils, lipids. Spectroscopic estimations/gravimetric determination of total sugars, amino acids, proteins, phenolics, flavonoids, alkaloids, terpenes, saponins, oils, lipids.
Characterisation using spectroscopic techniques - UV/VIS, FTIR, DSC (differential scanning calorimeter), NMR, MS, MALDI. XRD – single crystal and powder.

Unit IV

Phytochemical evaluation

Evaluation of phytochemicals for bioactive potential *in vivo in vitro*. Evaluation of phytochemcials for antimicrobial, antioxidant, antidiabetic, anti inflammatory, anti pyretic, diuresis, anti thyroid, anticancer, hepatoprotective activities and nutritional values. Toxicity study, route of administration, analysis. Ethical guidelines and clearance.

Unit V

Standardisation and validation of phytochemicals

Quality determination of herbal drugs. Role of processing methods and storage conditions on quality of drugs. Standardization parameters- impurity limit, ash content, extractable matter, moisture content, other phytocemicals, microbial contaminants, pesticides.
Validation of drug – guidelines, limit of detection and quantification of impurities, organoleptic properties, physical, chemical, biological characteristics, stability testing, storage conditions and packing system/unit.

Suggested Readings

Bourne, U.K. Kokate, Purohit C.K. and Gokhale S.B. (1983), Pharmacognosy. Nivali Prakashan Publication

Braithwaite, A and Smith F J (1996) Chromatographic Methods (5th edition) Blackie Academic & Professional London

Harborne J.B. (1973) Phytochemical methods a guide to modern techniques of plants analysis. Chapman and Hall, London Ltd.

Sadasivam. S and A. Manickam, Biochemical methods 2nd edition. New age International pvt New Delhi.