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Diploma in Pharmacy 1st Year
Pharmacognosy
Chapter 8 : Medicinal and Aromatic Plants

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PHARMACOGNOSY

Chapter 8

Medicinal and Aromatic Plants

- Role of Medicinal and Aromatic plants in National Economy and their Export Potential
- Plants are the chief and cost-effective source of various drugs and several chemical intermediates (essential in the manufacturing of various drugs).
- About 25% of current medications are obtained from plant components directly or indirectly.
- Morphine, codeine, papaverine, quinine, emetine, quinidine, digoxin, caffeine, hyoscyne, hyoscyamine, xanthotoxin, psoralen, senna glycosides, vincristine, vinblastine, ergot alkaloids, papain, nicotine, strychnine, brucine, colchicine, rutin, pyrethroids, and berberine are some of the plant-based medications being produced at the current time.
- Products of aromatic plants are widely utilised as spices, flavouring agents, perfumes, and medicines.
- They also provide raw ingredients for manufacturing various essential industrial chemicals.
- Ajowain, cedar wood, celery seed, citronella, eucalyptus, lemongrass, mentha, palmarosa, patchouli, turpentine, and vetiver are the essential oils produced in India.
- Some of these compounds are used as raw materials to manufacture industrial chemicals,
- e.g., B-ionone from lemongrass oil, which is used to make vitamin A.
- India has been dubbed as the World's Botanical Garden, with over 2200 species of medicinal and essential oil-producing plants, because of its diverse climatic conditions and geography.

Export Potential of Medicinal and Aromatic Plants

- Many medicinal plants are exported to other countries:
 1. Seed husk and seed of Isabgol (*Plantago ovate*)
 2. Opium alkaloids (*Papaver somniferum*)
 3. Leaves, pods and total sennoside concentrate of Senna (*Cassia angustifolia*)
 4. Root and root alkaloids of Periwinkle (*Catharanthus roseus*)
 5. Quinine and quinidine alkaloids (*Cinchona officinalis* and allied species)
 6. Ipecac root alkaloids (*Cephaelis ipecacuanha*)
 7. Solasodine (berries of *Solanum viarum*)
 8. Diosgenin/16 DPA (*Dioscorea floribunda* and allied species)
 9. Menthol and mint oil (*Mentha arvensis*)
 10. Celery seed (*Apium graveolens*)
 11. Citral and ionones from oil of lemon grass (*Cymbopogon flexuosus*)
 12. Gudmar herb (*Gymnema sylvestre*)
 13. Kuth root and essential oil (*Saussurea lappa*)
 14. Mehndi leaves (*Lawsonia alba*)
 15. Sindura fruits (*Bixa orellana*)
 16. Papain (*Carica papaya*)
 17. Podophyllum (*Podophyllum peltatum*)
 18. Rauwolfia (*Rauwolfia serpentina*)

19. Valerian (*Valeriana wallichii*)
20. Cassia tora
21. Guar gum (*Cyamopsis tetragonolobus*)
22. Gudmar (*Gymnema sylvestre*)

The essential oils are also exported regularly:

1. Jasmine otto and absolute (*Jasminum grandifloru*)
2. Agar wood oil (*Aquillaria agallocha*)
3. Sandal wood oil (*Santalum album*)

Indian Herbal Trade in World Scenario

- Demand and supply of herbal drugs are rapidly increasing The annual revenue generated by Indian herbal industry is about 2,300 crore as compared to pharmaceutical industry turnover of 14,500 crore with growth rate of 15%.
- India has exported many medicinal and herbal products in last few years. Globally, India is the second largest producer of castor seeds (with 1,25,000 tonnes per annum productive value).
- Isabgol, opium alkaloids, senna derivatives, vinca extract, cinchona alkaloids, ipecac root alkaloids, solasodine, Diosgenine/16DPA, menthol gudmar herb, mehndi leaves, papian, rauwolfia, guar gum, jasmine oil, sandalwood oil, etc.
- Are the major herbal pharmaceuticals which have been exported from India in the recent years.
- Overall revenue of herbal medicines (OTC products, ethical and classical formulations, and home remedies of traditional medicine systems) in India is about U.S. \$ 1 billion and export of herbal crude extract is about U.S. \$ 80 million.

Medicinal Plant Based Indigenous System of Medicine

- ✚ Approximately, 25,000 licensed pharmacies are under Indian medicine system; of which currently, 1,000 single drugs, and 3,000 compound preparations are registered.
- ✚ Out of 8,000 herbal drug manufacturers, not more than large scale manufacturers are in India.
- ✚ Annual turnover of Indian herbal industry was around U.S. \$300 million in Ayurveda, U.S. \$ 27.7 million in Unani.
- ✚ This value went up to U.S. \$ 31.7 million and the total turnover became U.S. \$ 48.9 million of Ayurveda and herbal products.
- ✚ Export of herbal drugs in India is around U.S. \$ 80 million.

Role in National Economy

- ◆ India is a hub of medicinal and aromatic plants.
- ◆ Ministry of Environment and forest has reported around 9500 plants species having medicinal value. These important plants species should be preserved and also cultivated to meet the demand of domestic industries and to exploit the bright prospect for export.

Medicinal Plants

- India is blessed with an expensive wealth of medicinal plants, which have contributed to the development of ancient Indian materia medica.
- The Charak Samhita (1000 B.C.) is one of the earliest treatises on Indian medicine.
- It records the utilisation of over 340 herbal medicines. Most of these herbals are still collected from wild plants to satisfy the demand of medical profession.
- The therapeutic properties of drugs are due to the presence of complex chemical substances (secondary metabolites) in one or more parts of these plants.
- Based on their composition, these plant metabolites are categorised as alkaloids, glycosides, corticosteroids, essential oils, etc.
- Alkaloids form the largest group, and includes morphine and codein (poppy), strychnine and brucine (nux vomica), quinine (cinchona), ergotamine (ergot), hypocyamine, (belladonna), scopolamine (datuna), emetine (ipecac), cocaine (coco), ephedrine (ephedra), reserpine (rauwolfia), caffeine (tea dust), aconitine (aconite), vaccine (vasaca), santonin (artemisia), lobelin (lobelia), etc.
- Glycosides form another important group, and includes digoxin (foxglove), stropanthin (strophanthus), glycyrhizin (liquorice), barbaloin (aloe), sennosides (senna), etc.
- Corticosteroids have recently gained importance, and include diosgenin (dioscorea), solasodin (solanum sp.) etc.

Aromatic Plants

- Aromatic volatile plants contain odoriferous and substances present in the roots, wood, bark, foliage, flowers and fruits as essential oils. gum exudates, balsam, and oleo-resin.
- The chemical nature of these aromatic substances depends on the complex chemical compounds.
- These aromatic substances are used as germicides and anti-hacterials; however, mainly they are Used in perfumery and the food-flavouring industries.

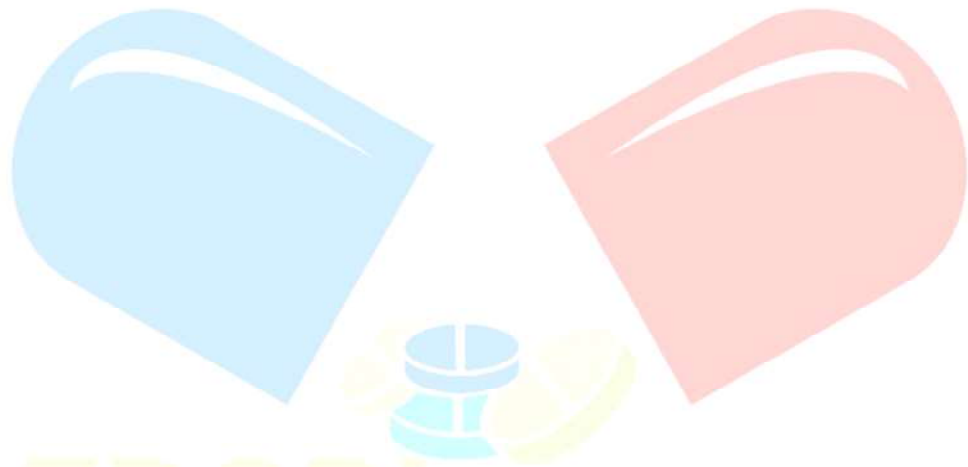
Volatile or Essential Oils

- ❖ Volatile oil contains the substances which impart odour and taste to the plant (essential oil).
- ❖ Since they evaporate when exposed to air, they can be obtained by distillation, expression, or extraction.
- ❖ Ethereal oils are those volatile oils, which are identical to or closely resemble the natural oils and can be made synthetically.
- ❖ Ajowain oil, cedar wood oil, celery oil, citronella oil, davana oil, eucalyptus oil, geranium oil, lavender oil, lemon grass oil, mentha oil, palmarosa oil, patchaouli rose oil, sandal wood oil, turpentine oil, and vetiver oil are the essential oils obtained from plants in India.
- ❖ Although, production of major oils is well-organised, a few developing countries have volatile oil rich flora which is not being fully utilised or cultivated.

- ❖ The United Nation Industrial Development Organisation has taken steps to set up a rural based small scale essential oil industry.

Indian Scenario

- ✚ Currently, Kerala is at highest position in production of black pepper, cardamom, and ginger; and also produces considerable amount of long pepper, and turmeric.
- ✚ Andhra Pradesh is alone producing more than half of the country's turmeric and chillies.
- ✚ The spices export during April-December 2008 was estimated to be 3,34,150 tonnes valued 3,810.95 crore (U.S. \$ 860.40 million) as against 3,25,320 tonnes valued 3,320.00 crore (U.S. \$ 821.45 million) in the corresponding period of the last financial year.
- ✚ During April-December 2008, export of most of the major spices has increased in terms of quantity and value, compared to the same period of last year.
- ✚ During April- December 2008, the export of pepper from India has been 19,100 tonnes valued at 317.77 crore as against 27,580 tonnes valued 400.20 crore of last year.
- ✚ The average export price of pepper has gone up from 145.11 per kg in 2007 to R166.37 per kg in 2008.
- ✚ During the period, India has exported 1,41,000 tonnes of chilli and chilli products valued R793.18 crore as against 1,49,755 tonnes valued 7807.03 crore of last year.
- ✚ Export of seed spices has increased in terms of quantity and value, compared to last year.
- ✚ Export of coriander seeds during April-December 2008 has been 19,600 tonnes valued at 137.23 crore as against 19,150 tonnes valued at 77.69 crore of last year, showing an increase of 77% in value.
- ✚ The unit value of export has increased to 70.01/kg in 2008 from 40.57/kg in 2007.
- ✚ The export of value-added products (curry powder, spice oils, and oleoresins) has substantially increased in terms of quantity and value, compared to last year.
- ✚ During April-December 2008, a total quantity of 10,500 tonnes of curry powder and spices valued 124.45 crore has been exported as against 8,375 tonnes valued at 81.10 crore of last year.
- ✚ The During April-December 2008, the export of spice oils and oleoresins has been 5,550 tonnes valued at 574.23 crore as against 4,815 tonnes valued at 404.04 crore of last years, showing an increase of 42% in value and 15% in volume. Against the export target of 4,25,000 tonnes valued 4,350.00 crore (U.S. \$ 1,025.00) for the year, the achievement of 3,34,150 tonnes valued F3,810.95 crore (U.S. \$ 860.40 million) up to December 2008 is 79% in quantity, 88% in rupee value, and 84% in dollar terms of value.



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