Herbs Cultivation & Medicinal Uses (2nd Edition)
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India is one of the leading Herbs producer and exporter in the world. Several meticulous researches were conducted and experimented with herbs. They arrived at more precise conclusions about the usefulness of diverse plants and herbs that are utilized in different fields like medicine. Ayurveda is the time honoured therapeutic form, prevailing in India since 2000 B.C. The Ayurveda healing is completely based on herbs, which have definite medicinal importance or significance. In the primeval times, the Indian sagacious held the view that Ayurveda herbs are the only resolution to treat numeral health related problems and diseases. Several meticulous researches were conducted and experimented with herbs to arrive at more precise conclusions about the usefulness of diverse plants and herbs that have medicinal value. Herbal products are replacing the synthetics products because of its harsh nature. Herbal products are in huge demand in the developed world for health care for the reason that they are efficient, safe and have lesser side effects. Growing herbs is easy to do, and people continue to turn their love for gardening into successful businesses growing and selling fresh cut herbs, herb plants, and other herb related products. Understanding the worth and heritage of excellence of Ayurveda in India the book makes an attempt to provide information on cultivation and medicinal use of herbs.

The book contains the Cultivation of different herbs with photograph of a variety of herbal plants. The book also includes the habitat constituents, action and use in Ayurveda, sidda and Unani medicines. The book contains information on more than 100 herbs. The book contains chapters on cultivation of some of the very important herbs like: Pyrethrum Cultivation, Periwinkle Cultivation and Belladonna Cultivation and many more. The book also has the abbreviations for languages section at the end.

There are many who have a genuine interest in understanding the medicinal benefits of herb. The book also has a section on some common home remedied that could be tried at home for quick relief of certain problems. The book can also be a good option for those looking for a guide to understand basics for starting cultivation of different herbs and taking it as a business opportunity. It is a ready manual and information database for traders, new entrepreneurs, manufacturers, project consultant and libraries etc.

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182Terminalia Chebula.
183Theobroma Cacao
184Thevetia Neriifolia
ABBREVIATIONS FOR LANGUAGES ETC.

Sample Chapter:
INTRODUCTION

Duboisia is endemic to Australian regions. The genus Duboisia is represented by three species, viz., D. myoporoides, D. leichhardtii and D. hopwoodii. The first two species are rich in hyoscine and hyoscyamine, whereas the third one contains tobacco alkaloids, nicotine and nor-nicotine. Recently, roots of D. hopwoodii have been found to contain substantial amounts of hyoscyamine and hyoscine; these are absent or merely detected in leaves. Brown first collected Duboisia myoporoides during 1802-1805 and named the genus 'Duboisia' in honour of the French botanist 'Dubois'. He described myoporoides in his Prodomus of 1810. Baron von Mueller described Duboisia leichhardtii in 1867, from specimens brought back by Ludwig Leichhardt, the explorer, and in his honour the specific name was given. As the specimens were lacking fruit, von Mueller placed the species in the genus Anthoceris. After ten years (1877), when fruiting samples were found, it was transferred to genus Duboisia.

Over 1000 ha of Duboisia are cultivated in Queensland, Australia. The species harvested are D. leichhardtii and D. myoporoides. The former is confined to South Burnett district, whereas the latter is found along the east coast of Australia. Presently, most of the leaves are gathered from D. leichhardtii. Recent investigations have shown that Duboisia species can be cultivated successfully in Japan.

In more recent years, a hybrid of D. leichhardtii and D. myoporoides has been developed. Higher alkaloid yields are observed in crosses, where the female parent was D. myoporoides. The alkaloid mixture is more complex than the parent species and contains only hyoscine, hyoscyamine and 6-hydroxy-l-canadine with traces of valtropine and butropine. The hybrid is readily propagated by cuttings; thus it is possible to obtain a plantation which has been derived entirely from clonal material. Finally, the development of an accurate analytical method made large cultivation trials feasible.

Up to this time, species of Datura and Physochalaina praetata Miers, had been the only source of these alkaloids in India. Seeds of Datura innoxia Mill, contain 0.2 to 0.3% of total alkaloids (0.1% hyoscine) and leaves of D. metel L. which contain 0.4 to 0.5% of total alkaloids (0.25% hyoscine), are the only source of hyoscine in India. Processing of such raw materials is considered uneconomical because of very low alkaloidal content. Similarly, leaves of Physochalaina praetata Miers (alkaloid content 0.6-0.7%) and Datura stramonium L. (0.3 to 0.8%) are the only source of hyoscyamine available in India today. Leaves of Duboisia myoporoides containing 2 to 4% of total alkaloids with more than 60% of hyoscine and 30% of hyoscyamine are the main source of tropane alkaloids in world today. Commercial cultivation of Duboisia is done only in Australia, mainly in Queensland area, from where it is exported to European countries for further processing.

First attempt of its introduction in India was made by the Forest Research Institute, Dehradun. But, commercial cultivation has not been established. Central Institute of Medicinal and Aromatic Plants, Lucknow is trying to establish it as a commercial crop in Northern Plains and Karnataka. Its large-scale commercial cultivation would turn India into a major supplier of tropane alkaloids and the country could earn a handsome amount of foreign exchange.

BOTANY

Duboisia myoporoides is a medium sized tree, stem woody with thick cork, vertically fissured. Leaf simple, petiolate, exstipulate, lanceolate, 9-10 cm long, 2-2.5 cm broad, entire margin, alternate. Inflorescence axillary and terminal cymes, dichasial to begin with and showing a tendency to scorpioid cymes. Flower small, white, pedicellate, actinomorphic. Calyx-5 sepals, persistent. Corolla-5 petals, tubular, shows green streaks at the throat of the corolla. Androecium-5 stamens, epipetalous. Gynoecium-2 celled, many ovules, axile placentaition. Fruit-berry, black on maturity. Seeds-5-6 in each berry, small, kidney shaped, 1 g
SOIL AND CLIMATE
Duboisia requires moderate climate where winter and summer temperatures are not severe. Areas with moderate rainfall of 1000 mm per year with well-distributed rains are ideal. High rainfall is harmful to the crop. Well-drained medium or light loam soil with neutral pH is ideal for growing the crop. The plant can be cultivated in the Deccan plateau of Andhra Pradesh, Karnataka, Madhya Pradesh and Maharashtra.

CULTIVATION
i. Preparation of Land
For the establishment of a new plantation, the soil is ploughed to a depth of 20-25 cm about 2-3 months before planting. The soil should be worked to a good tilth to eradicate weeds.

ii. Raising the Nursery
It is most conveniently propagated by seeds. Duboisia fruits which are initially green in colour, turn black on maturity. Flowering starts in November and continues up to April/May. Flowering and fruiting are profuse from February to April. The fruits either fall to the ground on maturity or picked from the trees. Each fruit contains about 5-6 seeds. They are then washed to remove all the pulp and dried in the sun before they are used for propagation.

Seedlings are raised in polythene bags containing a mixture of fine sand and farmyard manure in equal proportion. Two seeds are sown per bag. Germination starts from about the 12th day and by the 18th day, about 10% of the seeds germinate. Nearly 60% of the seeds germinate by about 40 days. It is, therefore, very essential to keep watering the nursery to ensure good germination. Ultimately, the seedlings are thinned, maintaining one plant per bag.

Pretreatment of seeds with gibberellic acid reportedly gives better germination. The seeds are soaked in 250 ppm gibberellic acid at about 40°C for about 24 hours. They are then thoroughly washed in fresh water to remove the chemical and dried in the sun. Treated seeds are used for sowing after about six weeks.

Seedlings attain a height of about 25 cm in three months in the nursery and at this stage they are ready for transplanting.

iii. Transplanting
After the initial discing and tilling of land, pits of 30 Ã- 30 Ã- 30 cm are made at 2 m Ã- 2 m spacing. The soil is mixed with the recommended dose of manure and fertilisers and made ready for transplanting. Healthy seedlings are transplanted, one into each pit and watered. One hectare will take 2,500 plants.

IRRIGATION
Plants are watered frequently in the intial stages. The frequency is gradually reduced and once the crop is well established, irrigation once in about 15 days is sufficient during the rain-free period.

FERTILISER APPLICATION
Farmyard manure at the rate of 20 tonnes per hectare and fertilisers (urea, superphosphate and muriate of potash) to supply 20 kg N, 40 kg P2O5 and 40 kg K2O per hectare are mixed well with the soil prior to taking up transplanting. Subsequently, nitrogen at 20 kg/ha is given to the crop at bimonthly intervals. Manure and fertilisers are supplied to the crop in the same dosage as above during the second and subsequent years of the crop growth.

PESTS AND DISEASES
Although pests and diseases are known to occur on Duboisia, it has not so far been affected by any serious pest or disease during the past 4-5 years of its trials in Karnataka. There was occurrence of green caterpillar (not identified yet), which was feeding on leaves and was controlled by spraying the crop with Malathion (0.03%).
**HARVESTING**

The plants grow very fast and will be ready for harvest in about 6 months from transplanting. The lower branches on the main stem up to a height of about 45 cm are completely removed to maintain clearance at ground level for general maintenance. The main as well as other side branches are cut at a height of about one metre retaining about 20% of the leaves in the plant. This encourages profuse branching and the left out leaves help in re-growth. Further harvest are made similarly at one metre height, at intervals of about four months. Accordingly, while two harvests are possible during the first year, three harvests a year can be taken from second year onwards. This practice of harvesting has already been successfully followed for nearly three years. The plants are likely to yield well for at least five years, after which replanting should be taken up if re-growth is not found satisfactory.

The harvested twigs are transferred to shade. The leaves are separated and spread out for drying.

**YIELD**

On an average, each plant gives about 2 kg of fresh leaves per harvest which on shade drying reduce to about 0.5 kg. Yield per hectare of fresh herbage is about 10 tonnes during the first year and 15 tonnes per year from the second year onwards. This on shade drying gives about 2 tonnes of air-dried leaves for the first year, and 3 tonnes from the second year onwards.

**ACTIVE CONSTITUENTS AND USES**

The leaves of **Duboisia** are used as raw material for production of tropane alkaloids, namely, hyoscyamine, atropine and hyoscine (scopolamine), which are used extensively in medicine throughout the world, because of their mydriatic, anticholinergic and antispasmodic action.

Hyoscyamine and atropine are also used in respiratory diseases like asthma, intestinal disorders, colic pain and peptic ulcer. Hyoscine is used for the treatment of motion and asthma.

The total alkaloid content of leaves of *D. myoporoides*, grown in Karnataka, has been found to vary from 2.75 to 4.90%. In a sample, hyoscyamine was 56.7%, hyoscine 23.3% and other alkaloids 20.0%. On an average, the plant gives a crop containing 3% of total alkaloids.

**ASPARAGUS ADSCENDENS**, Roxb.

(N.O.-Liliaceae)


**Habitat**-

West Himalayas, Punjab, from Murree to Kumaon, Gujarat, Bombay, Rohilkhand, Oudh, and Central India.

**Parts Used**-

Tuberous root or rhizome decorticated.

**Constituents**-

Asparagin, Albuminous matter, mucilage and sellulose. Powdered root is found to contain watery extract, cellulose, moisture and ash, which is 3.6 p.c.

**Action**-

Nutritive, tonic, galactegogue and demulcent. Rhizome is bitterish in taste. "Colour of the tubers is white and they swell up with water. Tubers have got excellent cooling and demulcent properties."

**Preparations**-

Confection and Powder. "The dried tuberous roots obtained in the bazar are known as 'safed-musli'.

**Uses**-

Tubers boiled in milk and sugars are used in spermatorrhoea, gleet and chronic leucorrhoea; also in diarrhoea, dysentery and general debility. It is used as a substitute for Salep. A compound powder containing many ingredients is given as a nutritive tonic in doses of from 5 to 30 grains in milk in cases of seminal weakness and impotence.

**CALOPHYLLIUM INOPHYLLUM**, Linn.

(N.O.-Guttiferae)
Habitat—Near the seacoasts throughout India.

Parts Used—Bark, seeds and leaves; bitter oil from the seeds and resin or gum.

Constituents—A resin of parsley odour and oil. Resin resembles myrrh and is soluble in alcohol. Kernel of the seeds yields a dark-yellow oil.

Action—Bark is astringent; its juice is purgative. The oil is rubefacient and irritant; but on the mucous membrane of the genito-urinary organs it is a specific. Its use is only external. Gum is emetic and purgative.

Preparations—Liniment and paste. Paste is made by mixing together pounded seeds of undi, seeds of cashew nut, borax and gamboge.

Uses—Oil expressed from the seeds (60 per cent) and known in Europe as the Domba Oil, is a highly esteemed external application in rheumatism; also in gonorrhoea and gleet; it is also applied to scabies (itch). Gum exuding from the wounded bark is a remedy for wounds and ulcers. Bark is used in decoction in internal haemorrhages and as a wash for indolent ulcers. Leaves soaked in water are applied to inflamed eyes. Gum mixed with strips of bark and leaves is steeped in water and the oil which rises to the surface is an application to sore eyes. Oil expressed from the kemels of the seeds is used as a stimulant application in rheumatism.

CINNAMOMUM CASSIA, Blume.
C. ceylanicum; C. saigonicum;
C. aromaticum & C. laurux.
(N.O.-Lauraceae)

Habitat—Indigenous to Ceylon (Galle District in the Southern Province and in the region of Negumbo in the Western Province). Southern India and growing in a wild state in the Western Ghats from the Konkan Southwards, and in the forests of Tennasserim (Burma).

Parts Used—Dried inner bark of the shoots from truncated stalks (Cinnamomi Cortex) and essential oil (oleum Cinnamom, B.P.).

Constituents—Volatile Oil 2 p.c., Cinnamic acid, resin, tannin, sugar, mannit, starch, mucilage, ash, etc. Oleum Cinnamomum B.P. is distilled from the cortex and consists chiefly of cinnamic aldehyde oxidizing into resin and cinnamic acid; also cinnamyl acetate and hydrocarbon, and "small quantities of phellandrene, pinene, linalol, carpophyllene, eugenol, etc., also exist. The British Pharmacopoeia limits the amount of aldehydes to 55 to 65 per cent but a genuine oil may contain as much as 75 per cent."

Different oils prepared from cinnamon are:
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