

CHAPTER I

I N T R O D U C T I O N

## INTRODUCTION

### THE CLIMATE

The Himalayas with their snow clad peaks extend along the whole length of northern frontier of India, a sub-continent in Asian region. This makes the climate and indeed the geography of the whole of north India what it is. The irregularly shaped peninsula jets out southwards into the Indian Ocean between the Bay of Bengal and Arabian Sea. India has some of the hottest, the wettest and the most arid regions on the earth. It also enjoys for part of the year a temperate climate. The climate as a whole is affected by its physiography. It is in this context, Hooker (1904) has rightly described the Indian flora as more varied than that of any other country in the eastern hemisphere, if not in the whole world.

### MODERN AGRICULTURE IN INDIA

For the last fifteen years, the over all policies of the Government of India have laid greater emphasis on scientifically oriented agricultural development. As part of the programme, operations are afoot for the introduction of modern agro-technology to replace the traditional farming. In this direction, the government has introduced the cultivation of special crops for the prosperity and welfare of the nation. Some of these crops are 'Medicinal' and 'Aromatic' or 'Essen-

tial oil' crops. In pursuance of this policy, the Central Indian Medicinal Plants Organisation was started in the year 1961 under the Council of Scientific and Industrial Research, in the Ministry of Science and Technology.

#### MEDICINAL AND AROMATIC PLANTS IN INDIA

There are about 18,000 species of flowering plants recorded in India of which 1,300 species are known to possess odoriferous principals while 2,500 species are known for their medicinal properties.

Indian vegetation is known for its fragrant roots, woods, leaves, flowers and fruits. The perfumery industry still rely on just a two dozen or so of essential oil bearing plants which are really very few compared to the available plant material. Taking into account the cultural and historical background of the sub-continent, it is surprising that very little work has been done in exploiting the vast resources in developing the plant based aromatic and pharmaceutical industry in this country.

#### INDIAN TRADE IN AROMATIC AND MEDICINAL PLANTS

The total export of essential oil and allied products is worth Rupees 80 millions\* (87,62,322.0 dollar or 46,10,951.0 pounds) to which Cymbopogon flexuosus (Steud.)

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\* Current exchange value — One pound = Rs. 19-35  
One dollar = Rs. 9-20

Wats and Cymbopogon martini Stapf. var. motia alone contribute 90%. A decade ago the export of C.flexuosus was about 1,000 tons and now the same is about 200 tons only. The value of C.martini var. motia is very high in perfumery because of the presence of geraniol and citronellal. The annual trade of this is worth 2.25 million rupees and the same could be raised further if the cultivation is improved by using rust resistant and high alcohol content strains like 90 MD.

Apium graveolens exports are more than 20 million rupees per annum. It is only from the year 1974, India made a beginning in the export trade of menthol which was for a long time in the list of aromatic imports. Other oils extracted from Anethum graveolens, Vetiveria zizanioides Stapf, Artemisia pallens Wall. etc., also being exported to some extent. Against the above mentioned export, the import of essential oils and aromatic chemicals was upto Rupees 32 millions during the year 1971-1972. For instance the annual import of oil of Cymbopogon winterianus Jowitt is around 300 tons which is worth 1.5 million rupees. The annual production is only 100 tons. The oil of Pelargonium graveolens Ait., is imported annually upto 5 tons worth one million rupees. Besides, others like oil of Jasminum grandiflorum Linn., oil of Coriandrum sativum L., oil of Bursera delpechiana Poiss., are also imported in considerable quantities.

It is difficult to indicate precisely the annual production of crude drugs and pharmaceuticals in India. During the

years 1970-71, India exported drug based products to the tune of 40 million rupees and in this export, Cassia angustifolia alone contributed as much as 33 million rupees. These figures do not reflect the country's self reliance in the matter of drugs and pharmaceuticals because during the same year, crude drugs and alkaloids worth Rupees 14 millions were imported.

#### SCOPE OF MEDICINAL AND AROMATIC PLANTS RESEARCH IN INDIA

There is a great scope for developing many known or less known essential oil bearing plants like Jasminum grandiflorum Linn., Pogostemon patchouli Pellet., Cymbopogon winterianus. Jowitt, Mentha piperita L. emend Hudson., Ocimum basilicum L., Coriandrum sativum L., Abelmoschus moschatus Moench., Anethum graveolens, Apium graveolens. Linn., Matricaria chamomilla L., Foeniculum vulgare Mill., and Pelargonium graveolens, Ait. Similarly, Chrysanthemum cinerariaefolium Vis., Solanum khasianum. C.B. Clarke., Dioscorea sp., Vinca rosea L., appear to be quite promising for the pharmaceutical industry. Keeping in view the above trends, the cultivation of the drug and essential oil bearing plants started recently and in fact it is still in infancy. There are factors which pose problems like the availability of the authentic seed and planting material, the know-how of agro-techniques of cultivation and management and of process development, the testing facilities for determining the active principles, the proper storage and marketing in and outside the country.

## USE OF MEDICINAL AND AROMATIC PLANTS IN INDIA

The Indian system of medicine is predominantly herbal, and perhaps is one of the oldest systems in the world. Despite the emergence of synthetic drugs and the discovery of several new antibiotics in recent years, the importance of drugs of vegetable origin still remains undiminished. The earliest record of the therapeutic value of the herbs is found in the 'Rigveda' (approximately 4,000 year old, ex Rajendra Gupta, 1973) which describes their amazing curing properties. However, even now the Indian Pharmacopœia recognises only 70 drug yielding plants. Reference can be made here for a few Indian medicinal plants which are gaining considerable importance due to their amazing curing properties. Vinca rosea grows almost as a wild weed throughout the warmer parts and now reported to contain more than 100 alkaloids, some of them like vinca leuce blastine, vincristin etc., are showing promise in curing diseases like cancer and diabets. The cultivation of Solanum khasianum, another indigenous medicinal plant is gaining popularity as a source of solasodine, used in the steroid industry.

### OBJECT OF PRESENT STUDY

The present study of "Fungi on Promising Medicinal and Aromatic plants growing in India", is an attempt to collate and report on fungi so far collected by the author during 1964-1974 on the medicinal and aromatic plants of India.

Keeping in view the present need of the industry, the future scope of export and general economic feasibility, in all 35 indigenous and a few exotic species of which 24 are aromatic (dealt in Part I) and 11 medicinal plants, (dealt in Part II) were selected for the present work. The name of the disease, wherever known, place of occurrence, symptoms, season of infection, pathogen and the associated fungi have been described. In majority of the cases, pathogenicity tests, were conducted and a detailed account of the pathogenicity experiments are given in a separate chapter. In case of Cercospora sp., no pathogenicity test was conducted and the pathogenic role was taken into consideration on the basis of symptomatology and nature of other fungi found on the affected regions. In a few cases where the disease is found to be on a relatively important host plants and causing more number of casualties or reducing the yield, incurring heavy loss like die-back of Bursera delpechiana anthracnose of Cymbopogon winterianus, Fusarium wilt of Pelargonium graveolens etc., such diseases have been studied in detail and suitable control measures have been tried. In some cases like die back of Bursera and anthracnose of citronella, the problem has been very effectively tackled by the application of protectant chemicals. The work is also under progress for controlling the other maladies.

The study of fungi occurring on these plants includes symptomatology, etiology, synonymy, morphology, classification

and in most cases, their pathogenicity. The terminology used in the description of the Imperfect Fungi, which are in a majority, is in accordance with the recommendations of the First Specialists' Workshop Conference, Kananaskis (W.B. Kendrick, 1971) and I have followed Ellis (1971) in describing them.