

Introduction

INTRODUCTION

Medicinal properties of plants were known to Indian people as early as 4500-1600 B.C. when Rigveda was written. Rigveda contained mention of a number of medicinal plants. Atharvaveda, which was written later, also included mention of some more plants used for the cure of diseases. Eversince the publication of Ayurveda (written between 2000-600 B.C.), medicinal uses of plants spread to different parts of the world, which was highly instrumental in the generation of a perpetual interest and curiosity for identification and production of plants for natural compounds of medicinal value.

The eight divisions of Ayurveda were followed by two important works namely "Sushruta Samhita" and "Charaka Samhita", written during 1000 B.C. The former deals with comprehensive accounts on therapeutics and the latter contains a remarkable description of "materia-medica", as known to the ancient Hindus. Later, during the Buddhist period, considerable progress was made and medicinal plants were cultivated under the direction of highly qualified specialists.

The Hindu system of medicine suffered a set-back during 1300-1600 A.D. when the Muslims brought their own system of medicine known as "Unani" system, which also gave considerable emphasis on plants as sources of drugs. In fact, during later period, the two systems of medicines gained considerable knowledge from one another and a great amount of work pertaining to collection, description and standardization of botanical drugs were worked out. The practitioners of various Indian systems in different parts of the country tried to utilize the locally growing plants as far as possible and accepted those which were found useful after clinical trials.

With the beginning of European as well as Western influence during 16th-17th century, it was the Christian period of Indian history when our knowledge regarding indigenous drugs increased considerably by virtue of systematic and scientific research. The first pharmacopoeia in India was published in 1863 and was followed by publication of comprehensive work on Indian medicinal plants in the form of "Pharmacographica India" by Dymock, Warden and Hooker (1890-1893),

which described the therapeutics used both in Eastern and Western systems of medicines. A summary of all previous works, combined with the most up-to-date account of medicinal plants was published in "Dictionary of Economic Products of India" by Sir George Watt (1889-1904). Consequently, physiological, biochemical, ecological and pharmacological aspects of plants began to be probed systematically which led not only to further broadening of our knowledge on medicinal plants but also opened up new vista of study of medicinal plants.

Due to varied soil and climatic conditions as well as altitudinal ranges, India has a very rich floral wealth, the vascular plants only being more than 15,000 species; out of which about 2,500 species are known to possess medicinal and aromatic properties. It is to be noted, however, that only three percent of the above has been recognised by Indian Pharmacopoeia for the use in medical therapy.

Medicinal plants are abundant in the tropical, temperate and alpine zones of Eastern and Western Himalayas of India. Of late, a few species are also being commercially cultivated in different parts of the country. The Directorate of Cinchona and other Medicinal Plants of West Bengal has been especially spearheading the cultivation of medicinal plants in Darjeeling Hills. Some of the important species presently being cultivated are cinchona (Cinchona ledgeriana, C. robusta, C. succirubra), ipecac (Cephaelis ipecacuanha) and dioscorea (Dioscorea composita, D. floribunda and D. prazeri). Ipecac, the "Green Gold", called both for its unique medicinal property and high economic potentiality, is one of the most important plants being cultivated in the lower foot hills of Darjeeling in India.

The drug ipecac or ipecacuanha is the dried root of Cephaelis ipecacuanha (Brotero) A. Richard belonging to the family Rubiaceae. Ipecaucuanha is the Portuguese name derived from Brazilian-Indian "Ipe-kas-guena" meaning "a creeping plant causing vomiting" (Habib and Harkiss, 1969). There are two principal commercial varieties of this drug, each named after the locality from where it was originally collected. They are : (i) Rio or Mattogrosso and Minas from Brazil; and (ii) Cartagena, Nicaragua, Panama and Savanilla from Nicaragua and Columbia.

Rio ipecac : Rio ipecac, also known as Mattogrosso and Minas variety, grows as wild undershurb in the moist, dense tropical forest in Brazil and Bolivia. At present it is also cultivated in the Indies and Federation of Malaya where it yields the commercial variety known as Johore ipecac. Rio ipecac root is reddish brown to dark brown and somewhat tortuous. Some roots are wiry and annulated; others are smooth and slender. The Minas variety closely resembles the Rio but the average alkaloid content is lower.

Cartagena ipecac : It is mainly obtained from plants growing in the damp and dark forests of Columbia, Nicaragua, Panama and Venezuela and is also known as Nicaragua, Panama and Savanilla ipecac. It closely resembles the Rio ipecac but is reported to be somewhat thicker roots with less pronounced annulations and larger starch grains.

The Indian ipecac is of Brazilian origin but it has assumed distinct characters probably due to the effect of different environmental factors prevalent in the region where the plant has been under continuous cultivation since many years. Brazilian ipecac is, by far, the most desirable source of the drug because of its highest emetine content which comprises the major portion of its alkaloid fraction.

History and nomenclature

Till 17th century when ipecac was unknown to the people of other parts of the world, the natives of Brazil used it for the treatment of diarrhoea and dysentery under the name "Igepecaya, Pecaya and Poaya" (Anonymous, 1971). The first European to become acquainted with the plant was Manoel Tristao - a Portuguese who, from 1589 to 1617, had been a pharmacist at different hospitals in Brazil.

In 1672, Le Gras, for the first time, brought ipecac root to Europe and introduced it as a medicine. But he could not work out the proper dosage. Jean Adreine Helvetius, son of a Dutch quack, learnt about ipecac root from a merchant named Garnier. In 1686, after working out proper dosage, Helvetius began to sell it as a secret remedy for dysentery. Later, the fame of this wonder drug reached the French court. After successful cure of the dauphin with Helvetius'

remedy, Louis XIV declared it a public property and offered money and honours to Helvetius for his wonder remedy (Anonymous, 1971).

When Hans Sloane of England and Leibnitz of Germany recommended the plant for dysentery in 1696, it became popular by the name Radix antidysenterica. After thirty years, Thomas Dover of Great Britain mixed ipecac powder with opium to produce the popular "Dover's diaphoretic powder". In 1788, both ipecacuanha and Dover's powder, for the first time, appeared in Pharmacopoeia Londinensis (Anonymous, 1971).

Ipecac was included in the critical list of drugs during the period of American Revolutionary War. According to the Army General Andrew Craigie, on December 2, 1775, there was only one pound of ipecac available for the entire army personnel. Therefore, John Morgan, the then Director General of Continental Army, had to send Barnabas Binny to Philadelphia in search of more ipecac but only 10 pounds of ipecac, that was available, could be purchased by him (Anonymous, 1971).

The actual source of the wonder drug ipecac remained a subject of dispute till the end of 18th century. In 1800, Antonio Bernardino Gomez, a physician in the Portuguese Navy, brought authentic specimens of the plant from Brazil to Lisbon where it was identified by another Portuguese, Felix de Avellav Brotero as Calicocca ipecacuanha (Fisher, 1973). In 1820, ipecacuanha was made official in the First United States Pharmacopoeia. In 1831, John Redman Coxe, M.D. described Cephaelis in American Dispensatory as Calicocca ipecacuanha (Griffenhagen, 1971). According to him the term "ipecacuanha" in South America implies "vomitting roots".

In due course ipecac plant was described as Cephaelis ipecacuanha in the United States and British Pharmacopoeias and the same name was accepted by International Code of Botanical Nomenclature (Fisher, 1973).

It was Sir George King who introduced the plant to India in 1866. He brought the plant from Kew, England to Royal Botanic Garden, Calcutta. But in 1870-71,

lack of follow-up care resulted in total mortality of the plants. The credit for the successful acclimatization and long-term cultivation of this plant in India goes to Dr. T. Anderson (Watt, 1972).

Three plants which had been sent from Kew to Rongbee Plantation of Sikkim in 1868 grew rather better. The population was increased to 300 by August, 1871 through root-propagation method. Trials were also conducted in Botanic Gardens at Barliar in Tamil Nadu by Mr. Mclivor in 1870 which succeeded fairly well. Three consignments of plants numbering 370 were received from Scotland in 1871-72, besides a smaller number from Royal Gardens, Kew. With these collections, the propagation had been so extensive that on 31st April, 1873, there were altogether 6719 young ipecac plants in Sikkim and 500 in Calcutta.

In Assam, the first trial of ipecac cultivation was undertaken sometime in 1949-50 at Nongpoh in United Khasi and Jaintia Hills at elevations of 450 to 820 m which was found to suit the species.

Ipecac was introduced to Mungpoo in 1871. However, its commercial cultivation took a long time for a successful beginning. In 1953, the cultivation of this valuable plant was undertaken by the then Medicinal Plants Committee of West Bengal. The foot hills of Rongo in Darjeeling District proved to be the best site for its cultivation and it was started there in 1957. Large-scale cultivation of ipecac soon began at Mungpoo, Munsong and Latpanchor at elevations of 500 to 900 m during the 1970s. Further extension of ipecac cultivation was speeded up in the subsequent years. The total area under ipecac cultivation in Darjeeling District at present (as by 1988) would be more than 100 hectares.

Botany

It is a perennial, straggling evergreen herb (Plate I) growing upto 60 cm in height. The roots of a luxuriantly grown mature ipecac plant measure upto 40 cm in length and 0.4 to 0.6 cm in diameter. The roots are in tufts, the secondary roots are also frequently branched. They have a thick yellowish-brown bark with a number of deep transverse incomplete furrows imparting a characteristic annulated appearance. The main stem is hard, sparingly branched,