GENERAL INTRODUCTION

a. INDIGENOUS MEDICINE

India was one of the pioneers in the development and practice of well documented indigenous systems of medicine, the more important among them being Ayurveda and Unani. For centuries the Indian population depended upon plant based crude drugs for the treatment of a variety of ailments.

Ayurveda has incorporated a very large number of plant species in the control of a variety of ailments of people and domestic animals. Modern phytochemical and pharmacological studies have confirmed the therapeutic potential of many plant species used in the Ayurvedic formulations. In the context of providing efficient and inexpensive medicine to the masses, it is necessary that the traditional medicine is evaluated in the light of current concepts and modern research in medicine and medical biochemistry, in order to be acceptable to one and all.

India continues to occupy a premier position in the use of drugs of plant origin. Kapoor and Mitra (1979) estimated that about 540 plant species are in use in different formulations in India. The richness of Indian medicinal plant wealth has attracted the attention of western scientists, the first one being Garcia de Orta (1563). Currently, there is a revival of this interest the world over. The World Health Organisation (WHO) (Penso, 1980), the
Food and Agricultural Organisation (FAO) and the United Nations Industrial Development Organisation (UNIDO) have emphasised the fact that:

a) more than 90% of the world's rural population particularly in Africa, China and India are exclusively dependent upon herbalists and traditional healers for maintaining a reasonable level of health,

b) there is an urgent need for consolidating and protecting this invaluable heritage, and

c) it should be improved.

The current rate of destruction of floristic elements in India has rightly sounded warning signals about the possibility of losing not only the known medicinally important plant species but also the medicinally potential other species of plants.

The 30th World Health Assembly resolved in 1977, among other things, that immediate practical and effective measures should be taken to utilise traditional systems of medicine (Ayensu, 1986). Pursuant to this, the WHO noted that since traditional medicine has shown to have intrinsic utility, it should be promoted and its potential developed for a wider use and benefit of mankind. Like the traditional systems of medicine in other countries, Ayurveda also requires to be evaluated, given due recognition and
developed to improve its efficiency, safety, availability and wider application at low cost (Ayensu, 1986).

India has about 18,000 species of angiosperms of which about 2,500 are considered important as sources of medicinal and aromatic chemical compounds. While the Indian Pharmacopoeia recognises only about 3% of these species, drugs of plant origin are about 40% in the listings of the Indian Pharmacopoeia (Ayensu, 1986).

In view of the insufficient official recognition to the potentially useful medicinal plant wealth, Mohan Ram (1980) noted that (a) identifying new sources of drugs, enhancing their yield, substituting those being largely imported into India and promoting those having high export potential and (b) collection, collation and dissemination of information on the medicinal plants for research and utilisation, are among the major urgent tasks to be undertaken in India.

b. GASTROINTESTINAL DISORDERS

Gastrointestinal disorders are among the most common ailments affecting a very large section of the world population. Indian indigenous medicine systems have a number of formulations aimed at relieving gastrointestinal symptoms and a number of plants are involved in the formulations.

Though there is a large number of symptoms of gastrointestinal disorders, emesis and purgation are the
main symptoms responsible for a lot of physical and psychological distress. On the other hand, emesis and purgation are also induced in controlling some gastrointestinal problems. While some symptoms of gastrointestinal disorders are due to physiological causes, many other symptoms have their origin in infection by microorganisms, particularly bacteria.

Several of the plant species used in the formulations, against gastrointestinal disorders in India, have pronounced antibacterial effects although the concept of microorganisms as pathogens was not firmly established in the ancient Indian medical practice.

There is no single comprehensive source of information on the plant species used in gastrointestinal disorders. The collection, collation and dissemination of information on these species is a much felt need. Such compilation should start with the works by Charaka, Sushruta and Bhavaprakasha, the three main traditional Ayurvedic texts and culminate in modern phytochemical and pharmacological literature.

c. LECTINS

Lectins are sugar binding proteins (or glycoproteins) of non-immune origin with the ability to agglutinate cells and/or precipitate glycoconjugates. Lectins can recognise specific sugars on cell surfaces resulting in cell
agglutination. Lectin induced agglutination is inhibited by a specific sugar and this distinguishes lectins from mammalian antigens.

Lectins can induce bacterial cell agglutination and inhibit their growth. This factor may be useful as an effective tool in the identification of the pathogen and control of infections caused by them. In addition, lectins can pre-empt the binding sites on bacterial cell surfaces preventing the binding of the pathogen to the gut membrane, which is an important event in pathogenesis.

Work in our laboratory has shown that lectins are present in several species of plants used in medicine (Shubha Rani, 1988 Sathyananda, 1989 Sharu Raj, 1989 Sangeetaa, 1991 Sathyanarayana Bhat, 1993). There is no information on the presence and/or role of lectins in the plant species used against gastrointestinal disorders.

d. OBJECTIVES OF THE PRESENT WORK

Against this background, the current work on the following aspects was undertaken with the objectives stated along:

a) to consolidate information that is currently spread in hundreds of diverse publications and to provide a source on the various aspects of plants used in the control of
gastrointestinal disorders in India from the times of Charaka and Sushruta to the present, in order to:

i) serve as an easily accessible nucleus of information on these species

ii) to highlight lacunae and areas that need further research and

iii) to highlight the therapeutic potential of the species

b) to compare the use of plant species in India against gastrointestinal disorders with that prevailing in other countries particularly Africa and China, so as to identify useful naturalised and/or cultivated exotic species found in India and to find new uses for native species common to those countries and India

c) to discover lectins in the plant species particularly in those parts of the plants that are used as sources of drugs in the control of gastrointestinal disorders, in order to:

i) employ lectins as tools to identify specific enteric pathogens

ii) identify lectins that agglutinate and/or inhibit enteric pathogens

iii) test the bacteriostatic and bactericidal effects of these lectins and plant extracts and

iv) identify sources of strong acting lectins for use in the control of enteric pathogens and
d) to gather experimental evidence on selected species regarding their potential for use in the control of enteric pathogens.

This thesis is organised into two parts:

Part I: Database of plants used in the control of gastrointestinal disorders, and
Part II: Experimental work on selected species.

For the sake of convenience the two parts are found in separate volumes.