INTRODUCTION

Geographically, Maharashtra can be divided into five regions Vidarbha, Marathwada, Western Maharashtra, and Northern Maharashtra Konkan. Marathwada has a total of 9000 villages. Marathwada which is one of the most backward areas of Maharashtra with an area of 65000 Sq. km. is divided into six districts – Aurangabad, Jalna, Parbhani, Osmanabad, Nanded and Beed. These districts are characterized by excessive dependence on agriculture, economic and industrial backwardness, and absence of minerals and low density of population. Marathwada was ruled for more than 200 years by the Nizam of Hyderabad and become free politically in 1948, after the Telengana movement.

The soil of Marathwada is generally stiff and dark colored. The land of the region is flat with an elevation ranging between 300 and 900 meters, Marathwada has extensive hilly ranges and spurts. But these ranges neither provide water for cultivation nor attract rains and hence are useless from economic point of view. However, they have contributed to the cultural history of Marathwada by nurturing the world famous caves monument of Ajanta and Eallora.

The two hill ranges of Aurangabad district are the Ajanta range and the Jalna range (Sahyadri range). The Balaghat range divides the district Beed into two zones and is the important hill range of this district. The Ajanta hills run through Kalamnuri, Hingoli, Jintur and Partur. Nanded district has only one main range which traverses the district from North West to south – east. The Balaghat hill range and its offshoots are found in the Osmanabad district.

The Godavari is the most important river flowing through Marathwada particularly serving the district of Aurangabad, Jalna, Beed, Parbhani and Nanded. The rivers such as the Purna and the Manjra are the biggest tributaries of the Godawari (Ganga).

The Aurangabad city was found in 1610 A.D. by Malik Ambar, The Prime Minister of Murtaza Nizam Shah of Ahmednagar on the sight of village called Khirki. Malik Ambar was succeeded by his son Fatheh Khah, Who Changed the name of Khirki to Fatethnagar. With the capture of Daulatabad by the imperial troops in 1633, the Nizam Shahi dominions including Fathnagar came under the possession of the Moghals. In 1653, when Aurangzeb was appointed the viceroy of the Deccan, he
made Fatenagar his capital and called it Aurangabad. Since then the city to be known as Aurangabad. New Aurangabad divisional Head Quarter of the Marathwada occupies a place of pride in the history of India. Lying at the crossroads of ancient trade routes and nestled centrally in the Deccan plateau, Aurangabad has naturally been the since on which a great many “Cunning Passage” of the history have been enacted and unfolded. Endowed with a rich cultural past and a capacity for absorbing the shock and transformations of historical change into its own characteristic personality, the city occupies an important place on the tourist map of the world. The city is festooned all around with an amazing variety of monuments, such as rock-cut temples in the mountains ravines of Ellora and Ajanta, strategic forts such as the one at Daulatabad and mosques and mausoleums with their minarets and domes such as Bibi-ka maqbara.

A] TOPOGRAPHY

Marathwada region comprising of eight districts, viz. Aurangabad, Beed, Hingoli, Jalna, Latur, Nanded, Osmanabad and Parbhani. The location of Marathwada is on 70°5’ – 78°5’ E longitude and 17°5’ – 20°5’ N latitude forms the part of the vast Deccan plateau all of India and is one of the six divisions of Maharashtra State.

The total area of Marathwada region is of 64,813 km. and is bounded by the Vidarbha region on the north, by Andhra Pradesh on the east and southeast, by Karnataka on the south and by western Maharashtra on the west. The entire region is situated at an average height of about 300-650 m. above Mean Sea Level gradually sloping from west to east, and is traversed by hill ranges origination from the Sahyadris in the West and the Satpudas in the North. Different ranges derive their names from local sources, the northern being Ajanta-Satmala ranges and the Southern the Balaghat ranges. In addition to these there are scattered hillocks of varying heights throughout the region, the highest peak, Surpal Nath (960 m. above MSL) situated near Kannad in Aurangabad.

B] GEOMORPHOLOGY AND SOIL TYPES

Geomorphologic ally the district comprises of varied topographic features and landscape consisting of high hills and plains and low lying hills. Most of the hill ranges are located in the northern part of the district. The Satmala hills and Ajanta hills extend from east to west. The Satmala hills and Ajanta hills extend from east to
west. The hills near Verul in Khulabad taluka are part of these ranges which extend to chawaka ranges Aurangabad hills. The Satamala range encompasses several hills overlooking the Tapi valley. From west to east they are Antur (826 m amsl), The Satoda (552 m amsl), Abasgand (671 m amsl) and Ajanta (578 m amsl). The Satmala hill (493 m amsl) from which name of the range is derived is situated north to Kannad town.

Marathwada is a part of the Deccan Plateau. In General the slopes in the district are towards south and southeast. The average elevation of the district is in the order of 500 m amsl. Within it are flat topped hill ranges extending over wide area and also hills separated by broad valleys.

Major parts of the Aurangabad district falls in Godavari basin with a small area in north eastern parts falling Tapi Basin. The major river in the district is the Godavari with its tributaries namely; Purna, Dudhna and Shiva River. The other important tributaries are Suka, Khelna, Gulathi, Shivbhadra and Girija River. Depending on the drainage and geomorphology, the Marathwada has been divided into 52 watersheds.

Soil plays a very important role in the agriculture activities and forest growth of the area. The fertility of the soil from agriculture point of view depends upon the texture and structure which controls the retaining and transmitting capacity of moisture and various nutrients such as nitrogen, phosphorous and potassium present in the soil. The formation of the soil in the area is influenced by the climate, geology, vegetation and topography. The major part of the district is covered by black cotton soil or ‘Regur’ formed by weathering of Deccan Trap Basalt. It is rich in plant nutrient such as lime, magnesia, iron and alkalis on which cotton and dry crops like Jower, Bazara and tur etc flourish. It swells and becomes sticky on watering while on drying are contracts and develops many cracks. Soil varies both in texture and depth.

Deccan traps are a thick pile of basaltic flows, horizontally disposed and apparently more or less uniform in composition. Each individual flow is a typical section, which varies from porous weathered base to a massive middle unit. The geological formations of the regions are characterized by the Deccan traps (Upper cretaceous to lower Eocene). The granitic rocks have given rise to red as well as black cotton soils. Major part of the region has deep black soil derived from the trap rock. Certain variations occur due to exposure and protection. A mixture of laterite and black soil, for example, is encountered in the eastern parts together with sandy soil.
along river banks. Most of the hill tops are bare or covered by coarse gravel while the low lying area accumulates clay and loam.

C] AGRICULTURE AND LAND USE

Out of the total 64, 30,371 hectare geographical land, about 22, 32,279 hectare in under forest, 6, 22,838 hectare is not available for cultivation comprising of non agricultural, barren and pasture land. About 23,182 hectare is a fallow land and about 27, 92,072 hectare land is net sown area. On the basis of fertility status, the entire land of Marathwada can be classified into 5 zones, the most fertile zone being in the southern parts of Osmanabad, the medium fertile zone scattered in Beed, Nanded and Osmanabad districts and most unfertile zone being situated in the south western parts of Aurangabad district. Chemically the soils are below normal and alkaline in reaction. The pH range from 6.5 to 8.5 soluble salts as measured in terms of electrical conductivity are in normal range with an average E. C. of 0.3 – 0.67 mm hos/cm. Organic carbon content of most of the soils mostly low to medium. The phosphorus is within the medium range. Zinc available to the crops varies from 0.8 to 6.4 ppm. Thus, the soils in general, are rich in Calcium and Magnesium carbonates and are deficient in Nitrogen and Phosphorus. This chemical composition is mainly responsible for cracking of the soil during summer.

D] CLIMATE AND RAINFALL

The weather, in general, can be said to be dry and moderately extreme. The average day temperature ranges from 27.7\degree C to 38.0\degree C while it falls from 26.9\degree to 20.0\degree C during night. Similarly summer and winter temperature also varies greatly. The highest during summer day being about 43.3\degree C, while the lowest during winter nights about 6.0\degree C. Relative humidity is extremely low for major part of the year (between 35 to 50\%) while it is highest (85\%) during monsoon. The rainy season is considered from middle of June to the end of September which is followed by a sultry period from about the end of September to the middle of November. The winter season commences from the middle of November and ends by the end of the January followed by a dry hot summer from February to middle of June. Summers are in general full of gusty winds. The normal average rainfall is about 90 cm but is rather variable form year to year. It has decreased considerable in the recent years. The major amount of South-West Monsoon precipitation is received on the West coast of
India due to the Sahyadris and only a small amount escapes through high hills which are received by the Deccan Plateau. The region thus falls in the rain shadow of the Sahyadris.

**E] FLORA AND FAUNA**

The climate of Marathwada region is generally hot and dry. It receives low rainfall. Some part of Marathwada having good fertile land with climate, so this particular region shows ample bio-diversity. Other part of the region also shows its importance by producing medicinal and other useful plants. Due to the lack of adequate rainfall, vegetation cover shows its diversified nature. An Aurangabad and Nanded district covers more forest area than the others. There are Teak, Sandalwood, Anjan, Moh, Tembhurni, and other kinds of trees in these forests. In Aurangabad district, Gautala is a well known sanctuary, Jayakwadi is also famous for bird sanctuary. Thorny scrub forests are having major trees like Bor, Babul, and Aloe-voera etc. A variety of wild animals can be seen in the above said forests like wild Boars, Foxes, Hares etc. Leopards are seen but rarely. There are many Monkeys and Baboons in the Marathwada area. The animals like Buffalos, Cows, Sheep’s, Goats, Poultry animals, Fishes and prawns are cultivated in this region. The famous variety of goat from Osmanabad district and ‘Devni Walu’ in Oxen family from Latur district are famous varieties and these are on of the assets of Marathwada region. The major agricultural crops of the Marathwada region are Cotton, Oil seeds, Bajra, Jowar, Groundnut, Wheat, Safflower and irrigated crops like Sugarcane which is one of the important irrigated crops. The other irrigated crops like Grapes, Bananas, Sweet Limes and Oranges etc. are also grown in the soil of the Marathwada. In the soil of Marathwada region variety of vegetables like Brinjals, Tomatoes, Onions, Potatoes and Leafy vegetables are grown. The Marathwada region is spread over 64,813 Sq.Km having population of 1, 56, 29,248 souls with population density 241 souls/ Sq. Km (as per 2001 census). The Godavari is the main river in the Marathwada region. The region is divided into Upper Godavari basin, Lower Godavari basin, Bindusara, Manjra, Manad, Terna, Teru and Lendi are tributaries of Godavari and Sukhna rivers.In 1976. (Human Development Report 2002 - Maharashtra (India) Dr. Babasaheb Ambedkar Marathwada University History of Modern India, Bipin Chandra, Orient Blackswan, 2009). The detail of the Districts with area covers, population and forest cover is tabulated in Table no. 1.
<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Name of the District</th>
<th>Area in (Sq. Km)</th>
<th>Population</th>
<th>Forest cover (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aurangabad</td>
<td>10107</td>
<td>2897013</td>
<td>7.6</td>
</tr>
<tr>
<td>2</td>
<td>Jalna</td>
<td>07718</td>
<td>1612980</td>
<td>1.3</td>
</tr>
<tr>
<td>3</td>
<td>Parbhani</td>
<td>06517</td>
<td>1527715</td>
<td>1.53</td>
</tr>
<tr>
<td>4</td>
<td>Hingoli</td>
<td>04524</td>
<td>987160</td>
<td>5.99</td>
</tr>
<tr>
<td>5</td>
<td>Beed</td>
<td>10693</td>
<td>2161250</td>
<td>1.7</td>
</tr>
<tr>
<td>6</td>
<td>Nanded</td>
<td>10528</td>
<td>2876259</td>
<td>12.25</td>
</tr>
<tr>
<td>7</td>
<td>Osmanabad</td>
<td>07569</td>
<td>1486586</td>
<td>1.20</td>
</tr>
<tr>
<td>8</td>
<td>Latur</td>
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<td>0.54</td>
</tr>
</tbody>
</table>
Indian sub-continent is a rich source of plant and animal wealth, which is due to its varied geographical and agro-climatic regions. Besides its varied biodiversity, it has a diverse cultural heritage too. Though at present Indian health care delivery consists of both traditional and modem system of medicines, both organized traditional system of medicine like Ayurveda, Siddha and Unani and unorganized system like folk medicine have been flourishing well. Ayurveda and Siddha are of Indian origin and accounted for about 60% health care delivery in general and 75% of rural Indian population depends on these traditional system. These two system of medicine use plants, minerals, metals and animals as source of drugs, plants being the major source. It is estimated that roughly 1500 plant species in Ayurveda and 1200 plant species in Siddha have been used for drug preparation (Jain, 1987, Krishna Kumar and Suresh Kumar, 1995). In Indian folk medicine use, about 7500 plant species are recorded as medicinal plants (Anonymous, 1996). Though the Indian traditional system of medicine are time-tested and practiced successfully from time immemorial, there is lack of standardization with regard to identity of crude drugs, methods of preparation and quality of finished products.

Textual variations exist among the innumerable literatures on traditional medicine on the constituents of a drug, methods of preparation and the names of medicinal plants. Multitude of vernacular names of medicinal plants found in the literatures pose problems in identifying the correct botanical names of medicinal plants. And, it is worst confounded with the use of different vernacular names, for the same plant, in different localities in the country. Vernacular names of some medicinal plants whose botanical identity are not known or ambiguous, find place in standard formularies and pharmacopoeia (Example: 'Avilthol' and 'Kiliyooral' have no botanical identity (Anonymous, 1972) and for the Sanskrit name 'Punarnava' two plants Trianthema portulacostrum, and Boerhaavia repens are mentioned (Mukerji, 1953).

Standardization of herbal drugs is most desirable at this time when worldwide interest on herbal medicine has gained momentum. Besides lack of standardization, unscrupulous commercial practice of adulterating and substituting the genuine herbal drugs are posing great hurdle in popularizing the time-tested herbal-based traditional medicine. To achieve WHO's proclamation of "Health for all by
2000 AD" traditional medical system have to be strengthened and popularized within the shortest possible time. Standardization of herbal medicine has the key to achieve this aim.

The term pharmacognosy is derived from two Greek words 'Pharmacon' meaning drug or medicine and 'gnosis' knowledge. C.A. Seydler first coined this term in his dissertation entitled 'Analecta pharmacognosia' in 1895. Pharmacognosy is closely allied to medicine, developed during early nineteenth century as a branch of Materia Medica and applied biology. It is a study of drugs having their origin in plant and animal kingdom. The subject pharmacognosy can also be expressed as an applied science that deals with biological, biochemical, therapeutic and economic features of natural drugs and their constituents. Tyler et al. (1981) defined that in a broad sense, pharmacognosy embraces knowledge of the history, distribution, cultivation, collection, selection, preparation, commerce, identification, evaluation, preservation and use of drugs and economic substances that affects the health of men and other animals.

In the earlier days, only the external morphological characters were used to identify a drug. As late as the beginning of the present century, pharmacognosy had developed mainly on the botanical side, being particularly concerned with the description and identification of drugs both in their whole state and in powder form. Modern aspects of pharmacognosy include not only the crude drugs but also their natural constituents and their derivatives.

Like other biological sciences, pharmacognosy has utilized related fields to bridge the transition from a descriptive science to a functional science. Various pharmacognostical methods are evolved to standardize crude drugs. Therapeutic efficacy of medicinal plants depends upon the quality and quantity of chemical constituents. It has been established that chemical constituents of a plant species vary with regard to climate and seasons (Tyler et al., 1981). A plant species grown in different geographical localities also show quantitative variation in their chemical constituents (Mallavarapu et al., 1995). Variation in biological compounds exists not only in species level but also in variety and cultivars levels too. Many varieties within a species might show variations in histological and phytochemical aspects. These differences exist among varieties of commonly occurred medicinal plants. These
variations might be climatic, altitudinal, geographical or genetical in nature. Many varieties of medicinal plant species are found in nature. Though pharmacognostical studies on individual medicinal plants, their constituents and their efficacious have been undertaken, little work has been done on comparative analysis of the variations in morphological, phytochemical and pharmacological aspects of varieties of medicinal plants. And to fulfill this gap, the present work is undertaken with a view to analyze, similarities and dissimilarities in morphological, anatomical, microscopically, physicochemical and phytochemical characters of the following varieties of plants. These plants are commonly available and medicinally useful in this geographical area and this study would form a foundation for understanding the pharmacological and therapeutically effectiveness of these varieties. In the standardization of a drug, organoleptical, morphological, anatomical, physicochemical, phytochemical, (qualitative and quantitative) and chromatographically methods are used.

Morphological and anatomical characters play a vital role in crude drug standardization. Morphological characters involve size, arrangement, venation, texture, surface characters, markings and hardness of the plant materials. As stated by Metcalfe and Chalk (1957), microscopically methods are often necessary to establish the botanical identity of commercial samples of medicinal plants, timbers, fibers etc. and may play an important part in checking adulteration and substitution. It involves longitudinal and transverse sectional views of the parts of the drug.

Plant based crude drugs whose botanical identity is not known are identified based on their morphological and anatomical characters. Park et al. (1995) studied the market samples of ‘Man Byung Cho’. Based on morphological and anatomical characters of leaf midrib and leaf lamina, he concluded that they belong to the leaves of Rhododendron brachycarpum and R. brachycarpum var. roseum. Yamaji et al., (1993) after studying the anatomical characters of flower stalk and xylem vessels of rhizome established that the drug 'Spang-RtziDo-Do' is evolved from Pterocarpus hookeri. Mehrotra and Sharma (1984) analyze the various market samples of the Ayurvedic drug 'Sappan' and compare with its genuine drug Caesalpinia sappan. Using morphological and anatomical parameters, they establish the genuineness of the drug.
Medicinal plants have been used as traditional treatments for numerous human diseases for thousands of years. Diarrhoeal diseases continue to be a major cause of morbidity and mortality throughout the world. Thus, their treatment by using medicinal plant is an important public health issue. Medicinal properties of plants are due to the active chemical constituents present in different parts of the plant (Mitscher et al, 1980). Even though pharmacological industries have produced a number of new antibiotics in the last three decades, resistance to these drugs by microorganisms has increased (Nascimento et al, 2000).

“Phyto” is the Greek word for plant. There are many “families” of phytochemicals and they help the human body in a variety of ways. Phytochemicals may protect human from a host of diseases. Phytochemicals are non-nutritive plant chemicals that have protective or disease preventive properties. Plant produces these chemicals to protect itself but recent research demonstrates that many phytochemicals can protect humans against diseases. There are many phytochemicals in fruits and herbs and each works differently. Medicinal plants continue to be an important therapeutic aid for alleviating the ailments of humankind. The search for eternal health and longevity and for remedies to relieve pain and discomfort drove early man to explore his immediate natural surroundings and led to the use of many plants, animal products, and minerals, etc. and the development of a variety of therapeutic agents. Today, there is a renewed interest in traditional medicine and an increasing demands for more drugs from plant sources. This revival of interest in plant-derived drugs is mainly due to the current widespread belief that “green medicine” is safe and more dependable than the costly synthetic drugs, many of which have adverse side effects. Nature has bestowed upon us a very rich botanical wealth and a large number of diverse types of plants grow wild in different parts of our country. In India, the use of different parts of several medicinal plants to cure specific ailments has been in vogue from ancient times (Bhattacharjee SK, 1998). India is rich in medicinal plant diversity. All known types of agro-climatic, ecologic and edaphic conditions are met within India. India is rich in all three levels of biodiversity, as species diversity, genetic diversity and habitat diversity (Zafar M, Iqbal A, Faiz M et al, 1999). Scientific analysis of plant components follows a logical pathway. Plants are collected either randomly or by following leads supplied by local healers in geographical areas where the plants are found. Initial screening of plants for possible antimicrobial
activities typically begins by using crude aqueous or alcohol extraction and can be followed by various organic extraction methods. Since nearly all of the identified components from plants active against microorganisms are aromatic or saturated organic compounds, they are often obtained through initial ethanol or methanol extraction (Vilegs JH, 1997). Natural products are known to play an important role in both drug discovery and chemical biology. In fact, many of the current drugs either mimic naturally occurring molecules or have structures that are fully or in part derived from natural motifs (Cheesbrough M, 2000). Natural antimicrobials can be derived from barks, Woods, leaves, flowers and fruits of plants, various animal tissues or from microorganisms (Gordon MC, David JN 2001). Although some therapeutic benefits can be traced to specific plant compounds, many herbs contain dozens of active constituents that, together, combine to give the plant its therapeutic value. Consequently, it is believed that the whole plant has more effective healing properties than its isolated constituents. Any part of the plant may contain active components (Nair R, Chanda S, 2004). For example, the roots of the ginseng plant contain the saponins and essential oils, while eucalyptus leaves are harvested for essential oils and tannins. Considering the aforesaid, it is assumed that the need of the hour is to search for new antimicrobials. With this In mind, in the present work, some selected plants are screened for their potential antimicrobial activity. A number of such studies have been done in various places of the world (Martinez MJ, et.al 1996, Kumarsamy Y, Cox PJ, Jaspars M et al 2002, Parekh J, Chanda S.,2006, Sudharameshwari K, Radhika J., 2007).

Plants have been formed the basis of natural pesticides, that make excellent leads for new pesticide development (Newman et al., 2000). The potential of higher plants as a source of new drugs is still largely unexplored. Hence, last decade witnessed an increase in the investigation on plants as a source of new biomolecules for human disease management (Grierson and Afolayan, 1999). Traditionally plants have been well exploited by man for the treatment of human diseases, Ayurveda is a good example, but not much information is available on the exploitation of plant wealth for the management of plant diseases, especially against phytopathogenic fungi. Fungi cause severe damage to stored food commodities. Among different species of fungi Aspergillus sp., Fusarium sp. and Penicillium sp. are associated with heavy loss of grains, fruits, vegetables and other plant products during picking, transit
and storage rendering them unfit for human consumption by producing mycotoxins and affecting their nutritive value (Miller, 1995; ). Many seed borne fungi, which cause severe damage to stored food commodities, were generally managed by synthetic chemicals, which were considered both efficient and effective. The continuous use of these synthetic fungicides started unraveling nonbiodegradability and known to have residual toxicity to cause pollution (Pimentel and Levitan, 1986). Pesticide pollution of soil and water bodies is well documented (Nstro et al., 2000). Hence in recent time application of plant metabolites for plant disease management has become important viable component of Integrated Pest Management, as plant metabolites are eco-friendly.

All human beings require a number of complex organic/inorganic compounds in diet to meet the need for their activities. The important constituents of diet are carbohydrates, fats, proteins, vitamins, minerals and water (Indrayan et al., 2005). Every constituent plays an important role and deficiency of any one constituent may lead to abnormal developments in the body. Plants are the rich source of all the elements essential for human beings. There is a relationship between the element content of the plant and its nutritional status. Some elements are essential for growth, for structure formation, reproduction or as components of biologically active molecules while others have some other beneficial affects (New Wall et.al., 1996). Qualitative or quantitative determination of mineral elements present in plants is important because the concentration and type of minerals present must often be stipulated on the label of a food. The quality of many foods depends on the concentration and type of minerals what they contains, also play a very significant role against a variety of degenerative diseases and processes, they may also prevent and reduce injury from environmental pollutants and enhance the ability to work and learn, some minerals are essential to a healthy diet (e.g. Calcium, Phosphorus, Potassium and Sodium) where as some can be toxic (e.g. Lead, Mercury, Cadmium and Aluminium). It is clear that mineral nutrition is important to maintain good health and because of that determination of As, Ca, Fe, Mg, Na, K, Zn, Ni, Co etc. have been added to Ayurvedic Pharmacopoeia of India (The Ayurvedic Pharmacopoeia of India, 1999).sayana drugs of various sources were discovered and applied in ancient Indian medicine since Vedic period. The use of mineral element is found to have been developed and used widely to cure several health problems. In Ayurveda, different plants are mixed-up with Louha Bhasma during the process of heating for
management of different diseases. The constituents of the ash also vary with time and from organ to organ. Ash usually represents the inorganic part of the plant.

Plants and other living organisms have great potential to treat human disease. There are two distinct types of biomedical research that seek to develop this potential. One type of research explores the value of medicinal plants as traditionally used, which constitute the only available medicines for most people in poor countries. Studies of these plants have the potential to determine which plants are most potent, optimize dosages and dose forms, and identify safety risks. Another type of research uses bioassays to identify single molecules from plants that have interesting bioactivities in isolation and might be useful lead compounds for the development of pharmaceutical drugs. Of the 2,50,000 higher plant species on earth, more than 80,000 are medicinal. India is one of the world’s 12 biodiversity centres with the presence of over 45000 different plant species. India’s diversity is unmatched due to the presence of 16 different agro-climatic zones, 10 vegetation zones, 25 biotic provinces and 426 biomes (habitats of specific species). Of these, about 15000-20000 plants have good medicinal value. However, only 7000-7500 species are used for their medicinal values by traditional communities. In India, drugs of herbal origin have been used in traditional system of medicines such as Unani and Ayurveda since ancient times. The drugs are derived either from the whole plant or from different organs, like leaves, Wood, bark, root, flower, seed, etc. Some drugs are prepared from excretory plant product such as gum, resins and latex. Even the Allopathic system of medicine has adopted a number of plant-derived drugs which form an important segment of the modern pharmacopoeia. Not only, that plant-derived drug offers a stable market worldwide, but also plants continue to be an important source for new drugs.

Among ancient civilizations, India has been known to be rich repository of medicinal plants. The forest in India is the principal repository of large number of medicinal and aromatic plants, which are largely collected as raw materials for manufacture of drugs and perfumery products. The knowledge about the use of medicinal plants has been acquired through centuries and such plants are still valued even today. Medico scientist practicing allopahthy and research minded vaidyas, Hakims have contributed valuable knowledge regarding efficacy of reputed medicinal
plants indigenous to India. Establishment of herbal forms in well selected localities will exercise scientific control over the cultivation of medicinal herbs (Kritikar and Basu 1987).

The phytochemical constituents and medicinal properties of most of the medicinal plants were recorded in the last few decades by a number of workers (Nadkarni, 1976, Joshi, 2000, Nudrat and Usha, 2005). These medicinal plants are subjected to various processes and are then administrated to the patients. The survey and documentation of medicinally important plants in each and every place is very much important for easy identification of local traditional healers, conservation and sustainable utilization. In India, we could locate thousands of plants, especially the angiosperms that are being exploited by the natives tribal in a variety of ways. The most important utilization of these plants is their application in medicines. However, plants and their parts and the pattern of administration vary from person to person. Thus, there is enormous scope for tribal medicines based on plant products which are yet to be studied, analyzed and documented.

Plants have always played a major role in the treatment of human traumas and diseases worldwide (Principe et al., 1991). They have been used as sources of modern drugs, either by providing pure compounds, starting materials for partial synthesis of useful compounds or models for synthesis of new drugs (Hansel and Swian, 1972). According to the World Health Organization (WHO) as much as 80% of world’s population depends on traditional medicine for their primary health care needs (Azaizh et al., 2003). The knowledge of medicinal plants has been accumulated in the course of many centuries based on different medicinal system such as Ayurveda, Unani and Siddha. In India it is reported that traditional healers use 2500 plant species and 100 species of plants serve as regular sources of medicine (Pei, 2001). Ethnopharmacological information is an important tool in drug discovery (Balandrin et al., 1993).

Developing countries use more than 80% traditional medicines for primary healthcare. (Farnsworth N and Soejarto, 1991; Pei shengji, 2002) The herbal medicines are in global demand. (Srivastava, 2000). In India, the Ayurvedic medicines are estimated in market level at 20% annually (Subrat, 2002). The
pharmaceutical drugs, consumed in developing countries is 15% only, and relatively more affluent people take a large proportion of even this small percentage (Toledo, 1995). Medicinal plants can provide a significant source of income for rural life in developing countries, especially through the sale of wild harvested material. Coastal vegetation contains many species of specific flora and thus it is an ecological storehouse rich in biodiversity and also has high ecological values. (Untawale, 1994; Banerjee, 1994) Pharmacognosy may also be defined as “an applied science which deals with the biological, biochemical, and economic feature of natural drugs and their constituents.” It is a study of drugs having their origins in the plant and animal kingdoms.

In a broad sense, pharmacognosy embraces knowledge of history, distribution, cultivation, collection, selection, preparation, commerce, identification, evaluation, preservation and use of drugs and substance of economic importance affecting the health of man and other animals. Such economically important substances includes a variety of commercial and medicinal product beside the crude drugs and their derivatives such as allergenic extracts, allergens, antibiotics, immunizing biologics, flavorings agent, condiment beverage, insecticides, rodenticides and herbicides often requiring complicated methods of preparation. In a restricted sense the definition of pharmacognosy in a particular knowledge of method of identification and evaluation of drugs.

Method of collection, curing, drying and assaying affect the quality and price of drugs; thus in so far as economic area is concerned, pharmacognosy is intimately associated with phases of pharmacy, administration, prescription, pricing and quality control, with the knowledge of drug constituents and their physical and chemical properties a pharmacist is able to predict incompatibility in actual compounding.

Pharmacognosy deals strictly with those substance designated as drugs. According to the tariff classification of U.S Government, the term drug means those substance, whether natural or synthetic, having therapeutic or medicinal properties and chiefly used as medicines or as ingredients in medicines.

Crude drugs are vegetable or animal drugs those consist of natural substance, and those have undergone no other processes other then collection and dryned. the term “natural substance” according to the Tariff classification, refers to those substance found in nature and are comprised of whole plants and herbs or plants or
parts therefore vegetable saps, extracts, secretion and other constituents therefore: whole animals or internal parts therefore, glands, or other animal organs, extractions and other constituents and which have not had change made in their molecular structure as found in nature.

The chief function of pharmacognosist (Wallis, 1985) are six, viz.

(1) To identify the source of material forming the drugs.

(2) To determine its morphological natuo investigate its potency, purity and freedom from admixture.

(3) To devise methods of cultivation.

(4) To prescribe details of processes of collection and preparation, and

(5) To study the constituents of the drugs and investigate their chemical reaction.

The information on the drugs could follow following sequence:-

i) **Origin**, includes the biological and geographical sources the history and the name.

ii) **Cultivation and preparation**, Including details of cultivation of the plant, methods of collection, drying, packing and other processing of the drugs during its commercial preparation.

iii) **Characters**, includes the physical characters, such as dimension, surface character, fractures, etc. and the sensory characters such as odor and taste, Microscopic and histological characters must also be studies and are often of fundamental important.

iv) **Constituents and Tests**, Constituents includes both the reputed active constituents and also other constituents who may need careful consideration when devising process of extraction for the manufacture of galenicals or when studying compatibility in depending practice chemical tests of identity are based upon the nature of the constituents.

v) **Evaluation**, this involves quantities measurement of two types; the first is based upon the physical character and the second upon the constituents. The first delimits the inclusion of foreign organic matter, thickness of stalk, etc. and the second type delimits extractives yields to water or alcohol or other solvent etc.
vi) **Adulterants**, including material added fraudulently and also matter which has become associated with the drug owing to carelessness in handling during collection, packing and transport.

The present study aims to probe into such raw materials of plant origin and evolve methods for their identification.

Pharmacognosy is closely related to both botany and plant chemistry and its history entitles it to be regarded as the parent of both. As late as the beginning of the present century pharmacognosy has developed mainly as a branch of botany, being particularly concerned with the description and identification of drugs both in the whole state and in powder. Their history, commerce, collection, preparation and storage were also considered as a part of herbal study. Presently they are the pharmacogonostic branches having fundamental importance. However, the rapid development of plant chemistry and pharmacognosy in recent years has lead to an elaborate study of plants of medicinal importance. In the particular, many plants never previously examined are now being screened for possible pharmacological activity and for active constituents such as alkaloids, saponins, flavanones, tannins etc. considering the plant population of the world as a whole a small percentage of species has so far been examined.

**The medicinally important plant taxa selected for the present study are:**

1. *Sesbania grandiflora* (L.) Poir.

**1) *Sesbania grandiflora* (L.) Poir**

*Sesbania grandiflora* (L.) Pers. is a soft wooded tree belonging to the family Paplionaceae. Flowers are rich in nutrients and are used as vegetables in rural area. Bark is used in treating small pox and other eruptive fevers. The juice from the flower is used to treat headache, head congestion, or stuffy nose. The powdered bark is also recommended for ulcers of the mouth and alimentary canal and infantile disorders of the stomach [Dhiman AK.2003]. Leaves are considered to be excellent sources of vitamin C, and calcium, the later is utilized to the same extent as the calcium in milk,
the utilization factors being 0.74% iodine content of the leaves is reported to be 2.3 g/100g. Pectin present in the leaves (1.5%) is of medium jelly quality. The saponins present in the leaves on hydrolysis gave an acid. Besides saponins, the leaves contain an aliphatic alcohol (Devdatta, Appanna1954). The leaves are used as aperients, diuretic, and tonic in form of poultice and they are applied to bruises. The barks of the plant are used as astringent, febrifuge and tonic and its infusion in small-pox. Besides the root juice along with honey is used as expectorant (Dhiman AK. 2003). Leaves are chewed to disinfect the mouth and throat. Hence, the medicinally and nutritionally important flowers were used for the antioxidant activities.

*Sesbania grandiflora* consist of dried bark of the plant *Sesbania grandiflora* (L.) Pers (Leguminous- sae) commonly called as Agati (SANS) and Hadga (MAR, found and cultivated in many Asian countries e.g. India, Malaysia and Indonesia etc. (Glenn EM 1972, Nadkarni AK1999). All parts of *Sesbania grandiflora* are utilized for medicine in diuretic, emetic, fevers, headaches, smallpox, anemia, bronchitis, inflammation, leprosy, gout, rheumatism, anxiolytic, anticonvulsive, hepatoprotective and potent antidote for tobacco and smoking-related diseases. In a number of cultures the root is used in inflammation, rheumatic swelling and fever, bark is used in smallpox, other eruptive fevers and ulcers, the juice of the leaves is used to treat worms, fever, gout, and leprosy, the flowers are used as emollient, bronchitis, gout and pain, fruits are used for anemia, bronchitis, fever, tumors, pain and thirst (http://www.impgc.com/test.php?id =Sesbania%20grandiflora. Accessed on 09/02/2009.).

Several reports suggested that the ethanolic extract of the bark of *Sesbania*. *Grandiflora* prevented acute gastric injury in rats, the leaf juice of *Sesbania grandiflora* showed significant antiurolithiatic activity (Ojha JK and Dwivedi KN 1996). In vivo studies, SF2 (*Sesbania Fraction 2*) administration showed potential anticancer [Doddola S 2008, anxiolytic (Laladhas KP 2009), hepatoprotective in rats (Kasture VS 2002), antimicrobial (Pari L and Uma A, 2003) and analgesic and antipyretic activity was evaluated (Krasaekoopt W and Kongkarnchanatip 2005).

*Sesbania grandiflora* commonly known as agathi as been uses as an important dietary nutritive source in southeast Asian country’s (Ferantinos, 1990-91). *Sesbania grandiflora* are richest source of amino acid, minerals and antioxidants vitamins (The wealth of India 1972, Govindan and Shanmugasundaran 1987.) Various parts of this
plant are used in Indian traditional medicine for the treatment of, (Vijayakumer et al. 1997, Pari and Uma, 2003.) It also has anxiolytic and anticonvulsant, (Kasture et al. 2002) anti-inflammatory, analgesic and antipyretic activity (Tamboli, 1996, 2000). Beside S. grandiflora is mentioned as a potent antidote for tobacco and smoking related diseases (Murugesan, 1988) S. grandiflora has hypolipidemic property on cigarette smoke exposed rats (Ramesh and Hazeenabegum 2006).

Free radicals are defined as molecules having an unpaired electron in the outer orbit. They are generally unstable and very reactive (Gilbert 2000). Free radicals may play an important role in the origin of life and biological evolution, implicating their beneficial effects on the organisms (Kolayli et al., 2002). They cause a majority of disease conditions like atherosclerosis, hypertension, ischaemic disease, Alzheimer’s disease, Parkinsonism, cancer, diabetes mellitus and inflammatory conditions and are being considered to be primarily due to the imbalance between pro oxidant and antioxidant homeostasis (Nakayama et al., 1998). Antioxidants, which can inhibit or delay the oxidation of an oxidizable substrate in a chain reaction, would therefore be very important in the prevention of diseases (Kikuzaki and Nakatani 1993). Antioxidative compounds obtained from natural sources such as grains, oilseeds, beans, leaf waxes, bark, roots, spices, fruits and vegetables, have been investigated (Chen et al., 1996). Nowadays food scientist and nutrition specialists agree that food antioxidants, consumed daily contribute to the conservation of good health (Halliwell and Gutteridge 1989).

*Sesbania grandiflora* (L.) Pers. is a soft wooded tree belonging to the family Paplionaceae. Flowers are rich in nutrients and are used as vegetables in rural area. Bark is used in treating small pox and other eruptive fevers. The juice from the flower is used to treat headache, head congestion, or stuffy nose. The powdered bark is also recommended for ulcers of the mouth and alimentary canal and infantile disorders of thstomach (Dhiman 2003). Leaves are considered to be excellent sources of vitamin C, and calcium, the latter is utilized to the same extent as the calcium in milk, the utilization factors being 0.74% iodine content of the leaves is reported to be 2.3 g/100g. Pectin present in the leaves (1.5%) is of medium jelly quality. The saponins present in the leaves on hydrolysis gave an acid. Besides saponin, the leaves contain an aliphatic alcohol Devdatta and Appanna 1954). The leaves are used as aperient, diuretic, and tonic in form of poultice and they are applied to bruises. The barks of the plant are used as astringent, febrifuge and tonic and its infusion in small-pox. Besides
the root juice along with honey is used as expectorant (Dhiman2003). Leaves are chewed to disinfect the mouth and throat. Hence, the medicinally and nutritionally important flowers were used for the antioxidant activities. Preliminary phytochemical screening of whole plant of *Sesbania grandiflora* demonstrated the presence of flavonoids, glycosides, saponins, alkaloids and triterpenes. Antibacterial activity of methanolic extract of *Sesbania grandiflora* (Saravana Kumar, et al. 2008)

*Sesbania grandiflora* (Fabaceae), popularly known as “Basna”, is an ornamental plant and is found in the plains of western Himalayas to Sri Lanka (Chopra et al., 1956). The bark is reported to cure diarrhoea, dysentery, paludism, snake bite, malaria, smallpox, eruptive fever, scabies, ulcer, and stomach disorders in children; in highdosis it causes vomiting and mild diarrhoea (Kirtikar, 1993). Due to the large use of *S. grandiflora* in folk medicine in India, the objective of the present study was to investigate the antiulcer activity of its bark ethanolic extracts when administered by the oral route in rats.

The bark extract of *S. grandiflora* prevented acute gastric mucosal injury induced by restraint stress and water immersion in a dose-dependent manner with ED50 of 36.75 mg/kg (p. o.). At the ED50, the bark extract did not modify the volume, pH and hydrochloric acid content of gastric secretion. It is known that pepsin requires the digestion medium be acidic for protein digestion. At pH of 1.6-3.2, the pepsin is more active. Its digestive enzymatic activity decreases as the gastric pH increases (Ganong, 1983). The lack of change in gastric secretion parameters observed with *Sesbania grandiflora* bark extract may be important because it may not interfere with the process of food digestion and the absorption of diet proteins, avoiding opportunistic infections of the digestive tract. The mechanism by which this extract produces antiulcer effect is not entirely clear, but the preventive antiulcer activity of *S. grandiflora* as showed in this study may be ascribed to the presence of tannins and triterpenes. Tannins have astringent action, precipitating proteins of mucosal membranes and skin (Costa, 1975)). According to Tani (1979) and Esaki et al. (1986) some tannins suppresses the gastric secretion, having a local action of protection of the gastric mucosa in stress-induced gastric lesion in rats. The action of the extract when administered intraperitoneally also prevented acute gastric mucosal injury produced by stress-induced lesions, revealing that probably not only tannins may be responsible for the antiulcer action. On the other hand, some triterpenes are known as antiulcer agents and its action has been mentioned to be due to: (I)
activation of cellular protection (Hara, Okabe, 1985; Murakami et al., 1982); (II) reduction of mucosal prostaglandins metabolism-citoprotective action (Konturek, 1986), and (III) reduction of gastric vascular permeability (Wagner, 1982).

The crude extracted solution of *Sesbania grandiflora* flowers had higher microbial inhibition due to higher flavonoids contents. Moreover, the crude extracted solution of these flower had the highest anti-microbial activity against *Staphylococcus aureus*, which is one type of food poisoning bacteria. In addition, the crude flavonoids extracted from these flower also had the similar anti-microbial activity to the extracted solution. (Wunwisa Krasaekoopt and Areeya Kongkarnchanatip 2005) The flowers and young leaves of *Seabania grandiflora* are edible and are often used as a vegetable to supplement meals. Tender pods may also be eaten as string beans. The dried leaves of both *Sesbania grandiflora* and *Sesbania Sesbania* are used in some countries as a tea which is considered to have antibiotic, anti-helminthes, anti-tumours and contraceptive properties. Bark exudates and seed endosperm gums are produced by many species of *Sesbania*, but are not seen as an alternative to gum arabic (Anderson 1989).

2) *Sesbania bispinosa* (Jacq.) Steud.

Dhaincha (*Sesbania bispinosa* wt. Syn.*S. aculeata* Poir. Syn. *Coronilla aculeate* Willd.) is a crop generally cultivated for its nutritive value to soil. It is cultivated in monsoon season almost throughout India and grows well in loamy, clayey, black and sandy soils. It is an ideal green manure crop as it is quick-growing, succulent, and easily decomposable with low moisture requirements and produces maximum amount of organic matter and nitrogen in the soil. Its seeds and fibre have been studied to yield galactomannans, lignins and cellulose (Mazumdar, A. K., Day, A. and Gupta, P. D. 1973, Farooqi, M. I. H. and Sharma, V. N., 1972, Kapoor, V. P., & et.al. 1989, Salpekar, J.et.al. 1997 *Sesbania bispinosa* is not considered as a crop of medicinal value. However, in continuation of our work on the unconventional plants to find out medicinally useful substances Misra, L. N. and Laatsch, H., 2000., Misra, L. N. and Siddiqi, 2000., Dixit, A. K. and Misra, 1997., Huq, F. and Misra, 1997 Misra, L. N. and Ahmad 1997, Siddiqi, S. A. and Misra, L. N.2000), the leaves of *Sesbania bispinosa* which have now yielded good concentration of (+)-pinitol. A process for the extraction of pinitol from this source has been developed by us and the method has recently been patented (Misra, L. N, 2002 )Pinitol or *O*-methyl inositol
(1-methoxy-2, 3, 4, 5, 6-penta hydroxy cyclohexane) is a natural product of cyclitol group occurring mainly in its (+) form in certain leguminous plants. It has earlier been isolated from the leaves of Bougainvillea spectabilis and was found to be responsible for Antidiabetic and hypoglycemic activities of its leaf extract (Ostlund, R. E et.al 1996 and Narayanan, C. R. et.al 1987)

It is an erect, low annual shrub with thick Woods. The Woods provide a strong durable fiber, which is used in paper industry. It is grown as a green manure (adding 150 kg N /ha), leaves used for forage and for poultry feed in South Africa. It has the capacity to suppress the weeds like Impacta cylindrica (Duke, 1981; NAS, 1980). Seed flour is used in the treatment of ringworm, skin diseases and wounds (Duke, 1981). The mature seeds of this species are known to be cooked and eaten by the Indian tribals, Katkharis and Ghonds (Siddhuraju et al., 1995b). Meager information is available on the nutritional potential and chemical nature of this underutilized legume.

The seed samples of Sesbania bispinosa were collected and analyzed for their chemical composition with a view to evaluate their nutritional potential. The proximate composition Sesbania bispinosa are found to contain high content of crude protein. The e seed samples contain relatively high content of crude lipid... Mineral profiles were also analyzed in all the three seed samples. The IVPD values range from 62.01 to 65.82%. The antinutritional factors such as total free phenolics, tannins, non-protein amino acid L- Dopa, oligosaccharides and haemagglutinating activity were also analyzed. Various processing methods such as soaking followed by cooking and enzymatic treatment to reduce/ eliminate the levels of oligosaccharides were also employed. The presently studied tribal pulses exhibit high level of nutrients, besides in vitro protein digestibility and low level of antinutritional factors. After conducting toxicological / animal feeding experiments, these little known tribal pulses may be recommended for large scale consumption Asian alternative potential source of protein.

Legume seeds are valuable source of protein, oil, carbohydrates, minerals and vitamins. They are playing an important role in human nutrition mainly in developing countries (Mohamed and Rangappa, 1992; Yanez et al., 1995). In the present study, Sesbania bispinosa shows high content of crude protein (31.08 %) Sesbania bispinosa the essential amino acids such as cysteine, methionine and threonine were found to be
deficient when compared with FAO / WHO (1991) requirement pattern. Linoleic and linolenic acids are the most important essential fatty acids required for growth, physiological functions and maintenance. The linoleic acid is found to be predominant in all the three investigated species. Its concentration is comparable to some wild legumes like *Adenanthera pavonica*, *Parkia clappertonaie*, *Bauhinia monandra*, *Cassia nodosa* (Balogun and Fetuga, 1985).

*Sesbania bispinosa* the essential amino acids such as cysteine, methionine and threonine were found to be deficient when compared with FAO / WHO (1991) requirement pattern. Phenolic compounds inhibit the activity of digestive enzymes like α-amylase, trypsin, chymotrypsin and lipase (Salunkhe et al., 1982) and decreases the digestibility of proteins, carbohydrates and availability of vitamins and minerals (Udayasekhara Rao and Deosthale, 1982). The levels of both phenolics and tannins in *Sesbania bispinosa* appear to be higher than an earlier report in the same species (Siddhuraju et al., 1995b).

The albumin of *Sesbania bispinosa* exhibits weak agglutinating activity; whereas, the globulin protein specifically agglutinates the erythrocytes of A and O blood groups. This is in agreement with an earlier report in the same species (Siddhuraju et al., 1995b).

The seed samples of *S.bispinosa* are found to contain the highest level of total oligosacchariads (M. Pugalenthil, V. Vadive 2004). Leaves and flowers are prepared as poultices for external application or taken as a decoction for internal ailments. Due to *Sesbania bispinosa*’s astringent properties, preparations made from it can be used against inflammation, bacterial infections and tumours. In traditional medicine, seed mixed with flour is used to treat ringworm and other skin diseases and worms. Agroforestry Database 4.0 (Orwa et al. 2009)

*Dhaincha* (*Sesbania bispinosa*) contain galactomannan gum. This gum is water soluble, produces a smooth, light-colored, coherent, and elastic film useful for sizing textiles and paper, as well as for stabilizing the mud used in oil drilling (Vietmeyer 1986). Galactomannan gum is also used as a stabilizer and thickener in food products such as ice cream, bakery mixes, and salad dressings. Guar is grown for gum production in India and the southwestern United States. The plant is hardy and very drought resistant and grows well on alluvial and sandy loams (Purseglove 1981). *Dhaincha* can be grown in a rotation scheme for soil improvement, to provide fiber
for paper pulp, for fodder, and has ornamental value (Vietmeyer 1986). Dhaincha appears to produce well on a large scale with little care or investment, and survives well on saline or wet soils (NAS/NRC 1979).

**Sesbania cannabina** (Retz.) Pers.

The flowers and young leaves of *Sesbania cannabina* are edible and are often used as a vegetable to supplement meals. Tender pods may also be eaten as string beans. The dried leaves of *Sesbania cannabina* are used in some countries as a tea which is considered to have antibiotic, anti-helminthic, anti-tumour and contraceptive properties. Bark exudate and seed endosperm gums are produced by many species of *Sesbania*, but are not seen as an alternative to gum arabic (Anderson 1989). Can also be used as shade trees for coffee, tea and cocoa as well as living trellises for pepper and as windbreaks for citrus, bananas and coffee. The crude protein content of the leaves is high (25–30% of dry matter) and they contain little tannin and other polyphenolics (*ILCA Annual Report 1987*). *Sesbania* is thus a useful source of protein for ruminant diets. neutral-detergent fibre (NDF), in vitro true digestibility, lignin, insoluble proanthocyanidins, and soluble phenolics.

*Sesbania cannabina* resorted to be aperient, diuretic, emetic, emmenagogue, febrifuge, laxative, and tonic, agati is a folk remedy for bruises, catarrh, dysentery, eyes, fevers, headaches, smallpox, sores, sore throat, and stomatitis (Duke and Wain, 1981). Bark, leaves, gums, and flowers are considered medicinal. The astringent bark was used in treating smallpox and other eruptive fevers. The juice from the flowers is used to treat headache, head congestion, or stuffy nose. As a snuff, the juice is supposed to clear the nasal sinuses. Leaves are poultec onto bruises. Rheumatic swellings are poultec or rubbed with aqueous decoctions of the powdered roots of the red-flowered variant. In India the flowers are sacred to Siva, representing both the male and female sex organs; their use as aphrodisiacs, , believing the fruits to be alexiteric, laxative, and intellectually stimulating, prescribe them for anemia, bronchitis, fever, pain, thirst, and tumors; the flowers, aperitif and refrigerant, for biliousness, bronchitis, gout, nyctalopia, ozoena, and quartan fever; the root for inflammation, the bark as astringent; leaves, alexiteric, anthelmintic, for epilepsy, gout, itch, leprosy, nyctalopia, and ophthalmic. Yunani consider the tonic leaves useful in biliousness, fever, and nyctalopia.
Indians apply the roots in rheumatism, the juice of the leaves and flowers for headache and nasal catarrh. Mixed with stramonium and pasted, the root is poulticed onto painful swellings. Flower juice is squeezed into the eye to correct dim vision. The bark is used in infusions for smallpox. Cambodians consider the flowers emollient and laxative, the bark for diarrhea, dysentery, and paludism. Malays apply crushed leaves to sprains and contusions. The gargle with the leaf juice to cleanse the mouth and throat. In small doses, the bark is used for dysentery and sprue, in large doses, laxative, in still larger doses, emetic. Pounded bark is applied to scabies. Philippines use the pounded bark for hemoptysis. The powdered bark is also recommended for ulcers of the mouth and alimentary canal. In Java, the bark is used for thrush and infantile disorders of the stomach. Leaves are chewed to disinfect the mouth and throat.