1.1. CLIMATE CHANGE AND ITS CAUSES

Science provided a scientific way for understanding a statistical significant variation in either the mean state of the climate or in its variability and also its causes. It is a beginning to help in initiating a powerful discernment of recent and possible impact that will affect people today and in coming decades. This thoughtfulness is very important for the reason that it allows decision-makers to place climate change in the condition of other vast challenges facing the nation and the world.

Alteration in the harshness and rate of acute high temperature and cold, floods and droughts, sensitively concerned with local air pollution and aero-allergens may effect in changes in transmissible disease incidence, in confined food manufacture and also in low nourishment, primarily to deteriorate child growth. There will also be heavy penalty of population dislodgment and financial problem. Changes in mean climatic situation and climate changeability also can have an effect on human physical condition via indirect pathways, mainly via changes in biological and environmental processes that manipulate transmittable disease-spread and food yields. Transmissible disease-spread should be apprehensive within an ecological structure. Infectious agents get the essential nutrients and energy by parasitisation of upper organisms. Mainly such infections are kind, and even some of them are valuable to both host and bacteria. Only some of infections that harmfully influence the host’s biology are named as “infectious disease”.

Atmosphere variations, one of the global ecological changes now under way, is expected to have a wide range of impact upon the amount of transmissible diseases among human inhabitants. The infectious negotiator (protozoa, germs, viruses, and so on) and the linked vector organisms (mosquitoes, ticks, sand flies, and so on.) are very small and devoid of thermostatic mechanism. Hence, there is a slight change of climatic circumstances-the climate wrapping-within which each infective or vector group can endure and replicate. The skin is the major organ in the body and one of its key functions is to look out the body from injurious substances, whether they are UV emission, poisonous chemicals or prolonged recurring coverage to water. This is the stage of exposure that determines if harm to the organism will outcome. The harm that can happen to the skin with sufficient experience will be measured. Contact dermatitis, compound de-pigmentation, halogen acne, connective tissue disease and skin cancer are the states which will be caused by ecological pollution. The tale of human fitness and disease in relation to ecological situation has very deep roots in human
pre-history and history. The state of present western sickness would have been as unrecognisable on the standard Palaeolithic hunter-gatherer, as it would be the urban resident of today.

Ecological squalor exerts substantial stress on person-fitness. Exposure to air, water and soil pollution, to chemical compounds in the surroundings, or to sound, can cause cancer, cardiovascular, respiratory and infectious diseases in addition to poisoning and neuropsychiatric disorders. Outside, air pollution is one of the mainly vital environmental troubles in OECD nations. It can have harsh health effects as penalty from short-term disclosure or chronic health impact as a result of long-term exposure. A few of them may be caused by hospital treatment, and others may be inoperable. Infectious water supply, uncleanliness and in-sanitation are accountable for 3% of all deaths and 4.4% of all years of life lost (YLL) worldwide. But the poorest developing nations are the nastiest affected; 99% of these deaths arose in non-OECD nations and 90% of these dying were kids. Even though the fitness impact of water-associated diseases stay very little in OECD nations (around 0.2% of deaths), some OECD nations are affected further than other nations. Within Brazil, Russia, India, China and South Africa (BRICS), hazardous WSH was responsible for 2.2% of all deaths and 3.5% of the whole load of diseases in 2002 of which 87% occur in India and China only. While death from dangerous WSH in the rest of the world are 40.5 times advanced than in OECD nations, and 2.7 times advanced than in the Brics. At the universal level, air effluence is approximate to be accountable every year for roughly 800000 untimely deaths, or 1.4% of all deaths internationally and 6.4 million years of life lost, or 0.7% of the world total. This load of disease is most important in embryonic nations, it causes an approximately of 39% years of life vanished in south-east Asia (e.g. China, Malaysia, Viet Nam) and 20% in other Asian countries (e.g. India, Bangladesh) (OECD, 2006 and 2008).

1.2. ENVIRONMENTAL POLLUTION

Pollution in easy terms is the introduction of contaminants into the atmosphere that causes volatility, harm or disorder to the natural balance that mostly comprise of the living organisms. Prior to the introduction regarding effluence one must have a suggestion about the word “pollutants”. Pollutants are nothing but just the waste or contaminants which are unconfined into the atmosphere. The pollutants can be recyclable and non eco-friendly as well.
1.2.1. Types of Environmental Pollution

According by the environment of pollutant effluence can be of the following types:

**Air pollution:** This is mostly described as the release of chemicals and particle matter into the atmosphere, for example: carbon dioxide, nitrous oxide, carbon monoxide etc. The key sources of these gases are the automobile-industries etc.

**Water pollution:** It happens due to the release of spoiled water which contains a variety of chemical components and is released into river streams, lakes, ponds etc.

**Light pollution:** It is caused by excessive light ant its use.

**Noise pollution:** It is mainly caused by automobiles, industries etc.

**Soil pollution:** It occurs due to the use of a variety of chemicals in farming and a lot of chemicals seep in land from different industries.

**Radioactive pollution:** It is caused by the radioactive compounds which are used for different purposes in dissimilar fields like medical science, nuclear energy generation etc.

**Thermal pollution:** It is something except just the change in the temperature of normal water body due to the human influences.

1.2.2. Pollution effects on health and environment

We all are well-known that one major enemy of current civilization is “Pollution”. In reality it’s a silent killer which is accountable for causing different diseases and several of them are fatal. Very few of us are conscious about its correct impact on our particular organs.

Pollution does have a harsh impact on human fitness and atmosphere. The incidence of different diseases is becoming more and more with the growing rate of population. The diseases mainly include respiratory disorder, cardiovascular disorders, skin infections, throat irritation etc.

The major impact of pollution on atmosphere is witnessed as the type of global warming. The other impacts contain biomagnifications, disorder in the environmental equilibrium by disturbing the food chain, smog formation, acid rains etc. In the current day
Effluence is a distressing topic and should be sincerely handled for saving our environment and for our very survival.

Ecological pollutants can cause anything - i.e. diseases, like cancer, lupus, resistant diseases, allergies and asthma, respiratory diseases. Higher levels of background rays have led to an increased rate of cancer and humanity related with it worldwide. Some kinds of illnesses are named after the spaces where explicit pollutants were first suitably engaged. One of the examples of such disease is Minamata sickness, which is caused by mercury compounds. Polluted air can affect life of human beings. Ozone toxic waste can be a cause of aching throats, roughness, irritation and chest ache. Oil spills can cause skin irritations, rashes and other skin diseases. Noise pollution induces hearing problem, high blood pressure, and strain on brain and nap problem.

Contamination caused by contamination can have very injurious effect in the brain and middle nervous system. Studies have disclosed that the brain of an animal really weakens from long-lasting disclosure to contaminants in the atmosphere. Heavy metals are also very harmful to the health those are normally present in groundwater in lots of areas. Usually in cities drinking water may get contaminated and spongy water channel joints in areas where the water channel and sewage line pass close mutually.

Skin is the mainly receptive part of the human body. According to the researchers anything we apply on the skin that passes through the layer “stratum corneum”. Due to air effluences, ozone speedily injects vitamin E (which indulges a healthy skin) from the upper most layer of the skin. Air pollution can be a main cause of pre age of skin. Dirt haze may create eczema if it makes contact with skin. Chemicals used in a variety of goods (paints, organize stuffs, lacquers, adhesive, building materials etc.) can easily poison the air. These agents enter into our body throughout breathing, and influence our lungs, eyes, nose, and can make skin allergy. Ozone is the wide-ranging component in the smog which leads to skin cancer. Moreover ozone, a further cause of skin cancer, is injurious. UV emission of sun, Halogen acne, chemical de-pigmentation, and connective tissue disease and skin cancer are a few of the normal skin diseases that cause injury owing to pollution.

Microbial diseases of the skin are usually transmitted by getting in touch with a contaminated human being. Still though the skin usually provides a blockade to disease, when it is penetrated by germs, diseases develop. Diseases of the eyes as well as caused along are measured with the skin disease as both the diseases occur at the shell of the body.
Physical examination of the skin and its appendage, as well as the mucous membrane, forms the foundation of the correct analysis of cutaneous situation. Several of these situations along with cutaneous surface change lesions, which have extra or less separate quality. Skin is the major limb of the human body, in regard to surface area and weight. It accounts for 15% of whole body mass. It serves as a significant environmental edge providing a defensive cover that is significant for homeostasis. On the further hand, skin is one of the main cause of poisonous abuse by a wide range of physical (UV radiation) and chemical (xenobiotic) agent which are responsible for varying its construction and functions (Kohen, 1999). Skin acts as a physical blockade and prevents injurious substances and bacteria from inflowing into the body. Skin always saves body tissues and systems of muscles, bones, nerves and blood vessels besides damage. Skin also controls the failure of fluid like blood and water, helps in modifiable body temperature during perspiration, and works as defender from sun’s harmful ultraviolet rays. Skin itself has three different layers. The epidermis or external layer is made up of generally dead cells with a protein called keratin. This makes the external layer water-resistant and is to be accountable for guard against the atmosphere. The dermis or center layer is composed of live cells. It also contains blood vessels that run throughout it and is mostly accountable for organization and support. The subcutaneous fat layer is mostly accountable for padding and shock absorbency. It also has organization like sweat glands, sebaceous glands, hair and hair follicles. Sebaceous glands exude an oily material called sebum and are set up on the whole surface of the body but for the palms, soles and dorsum of the feet. These protect hair and skin, and keep them away from dry-ness, brittle-ness, and fracture. These also restrict the increase of bacteria on the skin.

1.2.3. Infectious diseases

Infectious diseases, generally skin and mucosal infections, are very common in large numbers of tribal residents due to lack of hygiene, drinkable water and knowledge of hygienic food habits (Desta, 1993). This is to be projected that the skin diseases cover near about 34% of all occupational diseases. It is known that skin is primarily interface between the body and external environment, it supplies initial level of security to face injury by microbial and chemical agents. Many other factors rather than severe strain, trauma and primary skin diseases have been acknowledged as contributor to skin infections and it includes immune deficiency diseases, diabetes mellitus and systemic or topical use of steroids.
(Jawetz, et al., 1978). The most risky effect of disruption to the skin is incursion by pathogenic microorganisms (Robert and Kupper, 1999). Skin diseases can be caused by a big range of the microbes and skin is a safe place for various microbes. In the skin infections and soft tissue infections, the commonest bacterial agents are *Staphylococcus aureus*, *Streptococcus pyogenes*, *Clostridium perfringes* and the bacteriodes group. And some other bacterial agents are *Mycobacterium tuberculosis*, *Mycobacterium leprae*, *Neisseria gonorrhea*, *Pasturella tulurensis*, *Bacillus antracis* and *Pseudomonas aeruginosa*. The common fungi which are caused for skin infections are *Candida albicans*, *Candida neoformans*, *Epidermophyton flocossum*, *Trychophyton tonsurans*, *Melassezia furfur*, etc.

A very broad panel of microbial pathogens is associated with various skin infections. Gram positive *Staphylococci* and *Streptococci* are causing illness, furuncles, carbuncles, abscesses, impetigo and erysipelas. Gram positive *Corynebacteria* are a part of the physiological skin flora. But, *Corynebacteria* may cause opportunistic skin infections in immune suppressed patients. Gram negative *Escherichia coli* are the part of the physiological intestinal flora. However, outside the intestine they might cause wound infection and sepsis. Anaerobic Gram negative rods could be a source of skin infections under certain conditions or situations, i.e. in immune compromised subjects. The yeast namely *C. albicans* and *C. krusei* may begin or take place in low frequency on skin and mucous membranes without causing any symptoms either visible or invisible. Pathogens can over grow the normal flora and the source of skin diseases like impetigo and candidiasis in diabetics, adipose and immune deficient subjects (Madigan, et al., 2003). *Pseudomonas*, (Gram negative rod) is an ordinary pathogen for injury infections. *P. aeruginosa* is the major widespread among burnt patient’s pathogen competent of causing life-threatening illnesses (Lory, 1990). This bacterium is proficient in producing clinically significant infections such as injury and burn infections and blue-green pus (Murray, et al., 1990). A number of infections like hot tub folliculitis or nail infection might be mild but other infections could be incurable with no prompt treatment (Aleman, et al., 1999). *P. aeruginosa* is able to infect different body parts. Various considerations like to the ability to glue on the cells, least food requirements, resistance to various antibiotics, construction of proteins that damage tissue, protective outer coat, make it a strong opponent. Some of the diseases are caused by fungi which include candidiasis, ringworms, athlete’s foot, tinea pedis, sporotrichosis, blastomycosis and many others.
Staphylococcal infections - Staphylococci are Gram-positive cocci mainly occurring in clusters. The topmost identified pathogen in this group is *S. aureus*. This life form attacks hair follicles and causes folliculitis, also called as pustules. A deeper disease of the skin tissues is referred to as boil, abscess or furuncle. These lesions are frequently filled by means of pus. A great lesion rolling from a boil is known as carbuncle. Infections such as these are transmitted without any difficulty by skin get in touch with as well as by fomites.

Toxin-producing strains of *S. aureus* are the basic source of scalded skin syndrome. Recurrently it originates in youthful children and babies, this sickness is measured by vesicles on the body outer, which cause the skin to peel and give a scalded form. Penicillin or erythromycin antibiotics are generally used to treat this kind of disease and other staphylococcal skin diseases.

The disease Scarlet fever is caused by *S. pyogenes*, a Gram-positive bacterium occurring in encapsulated chains. General cases of scarlet fever begin as infections of the respiratory tract, followed by entrance of bacteria into the blood. The bacteria produce an erythrogenic toxin that causes the characteristic skin rashes. Penicillin is used for therapy. Diseases include injury to the heart valves known as rheumatic heart disease or damage to the joints, which is called rheumatic fever.

The disease Erysipelas is caused by *S. pyogenes* and other pathogenic streptococci. Small and bright, lesions develop at the site of streptococcal entry into the skin and cultivate sharply definite borders. Penicillin therapy is used for curing.

This disease Impetigo contagiosum is an easily spreadable skin infection accompanied by pus. This is caused by bacterial species of streptococci, staphylococci and others. This disease generally occurs in children and is simply transmitted among them. Penicillin therapy is frequently suggested.

Madura foot is a widespread name for infections of the feet due to various different microorganisms. Amongst the causes are species of soil bacteria belonging to the genera Nocardia, Actinomyces, and Streptomyces. These and other bacteria go through the tissues and cause granular lesions that increase timely and finally invade the bone and muscles. Sulfurlike granules indicate accumulations of microorganisms in the pus, and antibiotic therapy is required to avoid the expansion of the aforesaid disease.
Gas gangrene is the disease of the bottomless skin and wounds as well as of the blood. Relatively a lot of species of Clostridium cause gas gangrene, including *Clostridium perfringens*, *C. novyi*, and *C. septicum*. These anaerobic rods are transferred to the wound in their spore condition. They germinate and grow in the lifeless, anaerobic tissue of a wound, decomposing the proteins and fermenting the carbohydrates to produce gas. The gas causes the tissue to enlarge, and as the cells die from lack of oxygen, gangrene begins. Bacterial toxins pass through the bloodstream in the whole body to cause ill health all the way through the body, and deterioration of the muscle fibers happens. Strong antibiotic therapy and removal of dead tissue are much useful therapies.

Cat scratch fever possibly will go with a skin injury following a cat scratch. Even though the causative agent of this has not been identified with certainty, it is supposed to be a species of Rochalimaea or Afipia. Patients show a pustule at the skin site of entry and swollen lymph nodes on one side of the body. Treatment with antibiotics may or may not be successful. Mild fever and conjunctivitis often escort the disease.

Rat bite fever may be caused by either *Spirillum minor* or by *Streptobacillus moniliformis*. The first one is a flagellated spiral bacterium; the latter is a Gram-negative rod in chains. Both species are transmitted through a bite of rat, either wild or laboratory. Rat bite fever is coupled with skin lesions, intermittent fever, and a skin rash. Arthritis may also be present.

Infectious agents can be easily transmitted through direct or indirect contact. Direct contact occurs when a person is infected by contact with the reservoir, for example, by coming in contact with an infected person, ingesting infected meat, or bitten by an infected animal or insect. Transmission by direct contact as well includes inhaling the infectious agent in droplets emitted by sneezing or coughing and constricting the infectious agent through close sexual contact. Indirect contact happens when a pathogen can survive in the environment outside to its host for a long period of time before infecting another individual. Inanimate substances which are contaminated by direct contact with the reservoir may be the indirect contact for a susceptible individual. Ingesting food and beverages contaminated by contact with a disease reservoir is another example of disease transmission by indirect contact.
In developing nations, the World Health Organization (WHO) estimates that about three quarter of the population relies (depends) on plant based preparations used in their traditional medicinal system as the basic need for human beings. Plants produce a big diverse range of bioactive molecules, by making them rich sources of different types of medicine (Nair, et al., 2005). Natural products, either as pure compounds or as standardized plant extracts, provide an unmatched availability of chemical diversity in them (Parekh and Chanda, 2007). Various plants containing volatile oils, polyphenols and alkaloids as active constituents are utilized as accepted folk medicines, while others gain popularity in the form of finished products collectively named phyto-medicines (Al-Bakri and Afifi, 2007). Plants have always been the primary source of medicine throughout the world, as people strive to be healthy while facing chronic stress and pollution, and they cure diseases with medicines which work in accordance with body’s own defense. Plant-derived products can be exploited with sustainable, relative, comparative, competitive and other such advantages. These include reducing cost, they are less risky, more effective or efficient and readily available (Moorthy, et al., 2007). Tribal healers in most of the nations normally apply or utilize herbal medicine to cure cut wounds, skin infection, swelling, aging, eczema and gastric ulcer (Samy, et al., 1998). The different parts of plants used for skin diseases contain some active particles or components which are antimicrobial and nutritive in function and in nature (Esimone, et al., 2005).

In traditional treatment of various diseases, medicinal plants are used globally. *Acalypha wilkesiana* is a common ornamental plant in southern Nigeria and is used as herbal medicine in the treatment of undefined skin infections in children (Alade and Irobi, 1993). Iranian traditional medicine (ITM) uses plants in the treatment of burns, dermatophytes or other infectious diseases and also as antiseptic and anti-inflammatory agents (Ghahraman and Attar, 1998). Plants and its phytoconstituents are to be used as medicine to treat fungal infections primarily candidiasis such as oropharyngeal candidiasis, vulvovaginal candidiasis and others like spirotrichosis, chromoblastomycosis, etc. (Denning, et al., 1997). South African plant *Dodonaea vuscosa* Var. angustifolia, its leaves and twigs extracts are traditionally used as an agent in gargle for oral candidiasis (Van Wyk, et al., 2002). Septilin, an Ayurvedic herbal formulation, is used comprehensively as an immunomodulator and also used in the treatment of various skin infections and skin disease (Rao, et al., 1994). Benjamen (Benjamin and Lamikanra, 1981) and Abatan (1990) found out and told that leaf juice and decoctions of *Senna alata* are employed mostly in the treatment of ringworm and other skin...
diseases. Other various known herbs normally used in the treatment of skin infections which comprise *Quisqualis indica*, *Cormelina benghalensis*, *Amaranthus spinosus*, *Ramunculus scleratus* and *Cassia alata* (Damodaran and Venkataraman, 1994).

Medicinal plants form the base of traditional or indigenous system of health used by the majority of the population of most developing nations (Bodker, 2002). In recent trend, there is an enormous choice of awareness in the medicinal plants particularly which are used in Ayurvedas and other conventional systems of medicine of different nations. Our dependence on herbal medicines further increases when it comes in the light that synthetic drugs generate various side effects. Previously many people reported about the Ethno-medicinal plants which were used for various ailments. In the investigation or testing, attempts will be made to screen the extracts/active fractions and separate pure bioactive which is having the potentials to cure various skin diseases with the help of natural extracts.

1.3. **MEDICINAL PLANTS**

Herbs are coming to reappearance and herbal ‘renaissance’ is occurring all over the earth. In current scenario medicinal products derived from these plants are much safer than to the so called man-made artificial medicines because these synthetic products are unsafe, not only to human being but also to nature and our surroundings. In spite of attributing towards medicinal, flavouring and aromatic qualities however the man made products for medicine had been preferred over a considerable time and thus the importance of these medicinal products dominated over the natural herbs. However, this irrelevant trust on the synthetic product is finished now and people are coming back to these natural medicinal products for their health care in order to achieve a safe and secure treatment.

If we go through the medicinal treatment at the mass level, we find that 75% of the total mass of earth still relies on plants and their extracts for their health treatment. About one third of the existing herbs on the globe were utilized for health care treatments and cure of diseases not from the modern history but since ancient time. According to an analysis it was estimated that the world trade for medicine derived from plants account for about two lacs crores. In this medicinal trading and marketing our country contributes to less than Rs. 2000 crores. From Rs.130 crores in 1991-92 to Rs.165 crores in 1994-’95 the export of raw drugs by our country has slowly increased up to twenty six percent. The annual production of this medicinal and aromatic plant’s raw material is worth about Rs.200 crores which is likely to reach US $1150 by the year 2000 and US $5 trillion by 2050.
It has been approximated that in developed countries like U.S.A, herbal medicines build up as much as twenty five percent of the total medicines, while in fast developing countries like China and India, the role is about eighty percent. Therefore, the economic significance of plant derived-medicines is much more to developing countries like India than to other countries. These countries supply two-thirds of the plants used in modern system of medicine and the health care method of rural mass rely on home-grown systems of medicine. Of the 2,50,000 higher plant variants on earth, more than 80,000 are medicative. Being amongst the world’s twelve biodiversity centres, India is having more than 45000 different agro-climatic zones, 10 vegetation zones, 25 biotic provinces and 426 biomes (habitats of specific species). Of these, approximately 15000-20000 plants really have good medicinal importance. But, only 7000-7500 species are used for their medicinal significance by traditional communities. In India, medicines made from herbs have been used in customary systems of medicines like Unani and Ayurveda since historical time. The Ayurveda medicinal system uses about 700 species, Unani 700 species, Siddha 600 species, Amchi 600 species and modern medicine around 30 species. The drugs are derived either from the whole tree or from various portions of trees, such as leaves, stem, bark, root, flower, seed, etc. Few medicines are manufactured from excretion products of plant like gum, resins and latex. Even the Allopathic medicinal system has adopted a lot of drugs of herbal foundation which contribute a significant part of the present day stock of medicinal drugs. Some very important chemical intermediates required for manufacturing the modern medicines are also acquired from plants (Eg. diosgenin, solasodine, b-ionone). Not only, these herbal products provide a permanent market throughout the world, but also plants continue to be an important source for new drugs.

Customary methods of drugs continue to be widely used for different sake. The exceeding rate of people, inadequate supply of medicines, expensive price of treatments, side effects of several allopathic medicines and due to problem in developing the modern drugs for contagious diseases have led to boost emphasis on the use of plant materials as a source of medicines for a wide range of human diseases. Worldwide calculation signifies that almost eighty percent of 4 billion populations cannot afford the products of the Western Pharmaceutical Industry and have to depend upon the uses of customary medicines which are generally derived from plant materials. This fact is very well recorded in the inventory of medicinal plants, listing over 20,000 species of medicinal plant. In spite of having strong effect and our faith on allopathic drugs and great development in synthetic drugs, a large part
of the world mass still likes herbal products. In a number of the developing countries the use of plant drugs is increasing because modern life-saving drugs are beyond the reach of 75% of the world’s mass although many such countries spend about 40-50% of their total capital on medicines and health care. As an important part of the strategy to cut down the financial burden on developing countries, it is clear that an improved use of plant drugs will be practised in the coming time.

Among all the historical civilisations, India has been known to be prosperous store of medicinal plants. The Indian forests are the main repository of large number of medicinal and aromatic plants, which are largely collected as raw materials for manufacture of herbal drugs and perfumery products. Near about 8,000 herbal treatments have been codified in Ayurveda. The Rigveda (5000 BC) has listed 67 medicinal plants, Yajurveda 81 species of medicinal plant, Atharvaveda (4500-2500 BC) 290 species of medicinal plant, Charak Samhita (700 BC) and Sushrut Samhita (200 BC) 1100 and 1270 species respectively in compounding of drugs and these are still used in the classical formulations in the Ayurvedic system of medicine. But luckily, maximum ancient learning about plants is becoming widely spread at an alarming rate. There is a fast reduction of forests, reducing the availability of raw plant material for drugs. Near about 50% of the tropical forests, the store houses of the trees and animal diversity have already been destructed. In India, deforestation is appearing at an annual rate 1.5 mha/yr. What is left now is only 8% as against a compulsory 33% of the geographical area. Several valuable medicinal plants are under the verge of extinction. The Red Data Book of India has listed 427 species which are in risk, in which 28 are known to be extinct species, 124 endangered species, 81 vulnerable species, 100 rare and 34 insufficiently known species (Thomas, 1997). Ayurveda, Siddha, Unani and Folk (tribal) drugs are the most valuable systems of home-grown drugs. Among all these systems, the most evolved Ayurveda system is used broadly in India. Ayurveda dating back to 1500-800 BC has been a necessary part of Vedic culture. The term “Ayurveda” is derived from the Sanskrit root Au (life) and Veda (knowledge). As the name implicates it is not only the science of cure of the illness but covers the complete scope of prosperous human living dealing with the physical, metaphysical and the spiritual prospects. Ayurveda acknowledges that along with the equilibrium of physical constituents of body one has to possess an illuminated state of awareness, sense organs and mind if one has to be completely healthy. Ayurveda is getting importance as the natural system of health care all over the globe. Today this pharmaceutical system is being used in countries such as Nepal, Bhutan, Sri Lanka, Bangladesh and Pakistan,
while the conventional medicinal system in the other countries such as Tibet, Mongolia and Thailand seem to be deduced from Ayurveda.

These plant derived drugs are also being practised at an increasing rate in Western Europe. In recent time the Government of United States has established the “Office of Alternative Medicine” at the National Institute of Health in Bethesda and it supports to alternative research in medicines regarding customary methods of drugs such as Chinese, Ayurvedic, etc. with a view to measure the possible consolidation of effective treatments with modern medicines. The advancement of systematic pharmacopoeias dates back to 3000 BC, when the Chinese were already using over 350 herbal treatments. Ayurveda, a system of herbal medicine in India, Sri Lanka and South-East Asia has more than 8000 plant remedies and using near around 35,000-70,000 plant species. China has under laid the best utilization of herbal remedies and health care through plants drugs. China has pharmacologically validated and enhanced many traditional herbal medicines and eventually added those herbal medicines in formal health care system.

Green plants produce and maintain a kind of biochemical merchandise, many of them are capable of being extracted and used as chemical feed stocks or as raw material for various scientific investigations. Many secondary metabolizable substances of plant are commercially very important and find utility in a number of compounds used in medical treatment. However, a fixed supply of the source material often becomes difficult due to the various factors like environmental changes, cultural practices, diverse geographical distribution, labour cost, and selection of the superior plant repository and over utilization by pharmaceutical industry.

Plants, specifically used in Ayurveda can supply biologically energetic molecules and lead structures for the progress of modified derivatives with increased activity and /or reduced toxicity. Some of the flowering plants that have up to now been analysed have provided near about 120 therapeutic agents of known structure from about 90 species of plants. Some of the helpful plant medicines comprise vinblastine, vincristine, taxol, podophyllotoxin, camptothecin, digitoxigenin, gitoxigenin, digoxigenin, tubocurarine, morphine, codeine, aspirin, atropine, pilocarpine, capscicine, allicin, curcumin, artemisinin and ephedrine among others. In some of the cases, the primitive extract of medicinal plants may be used as medicaments. From another point of view, the detachment and recognition of the active main beliefs and clarification of the mechanism of action of a drug is of critical
significance. Therefore, the works in both mixture of conventional drug and single active compound are very important. Where the active particle cannot be synthesised economically, the product must be fetched from the cultivation of plant material. About 121 (45 tropical and 76 subtropical) main herbal medicines have been discovered for which no artificial one is presently available. The scientific study of traditional drugs and origin of drugs by bio-prospecting and systematic conservation of the referred medicinal plants, are thus of vital significance.

A large problem in Ayurveda is the shortage of drug standardisation, information and quality control. The great numbers of the Ayurvedic drugs are in the form of unrefined extracts; they are the mixtures of the different components and the active principles. When isolated, they individually fail to give desired activity. It shows that the activity of the unrefined extract is harmonically the result of its different constituents. In the deficiency of pharmacopoeia data on the various plant extracts, it is not possible to segregate or standardise the active contents having the desired effects. Ayurvedic pharmacopoeia assembled on modern lines and updated regularly is a very urgent requirement.

According to evidences and analysis, toxic outcomes of radiations and chemotherapy in cancer remedies could be mitigated by the use of Ayurvedic drugs and similarly surgical wound healing could be speeded up by Ayurvedic drugs. Recent technology and science have an important contribution to play in the process. A combined approach for the management, maintenance and restoration of important plant species by the plant molecular biology, plant tissue culture, research on the basis and working of Ayurvedic medical practice; separation of active constituents and their development into new therapeutics; standardisation and confirmation of known herbal medicines and other related aspects, need to be focussed upon (Sharma, et al., 1997).

In spite of the changing nature of crops grown in the country and the presence of a rapidly developing pharmaceutical sector, the share of India in world trading is quite insignificant considering its big geographical area. However, this is confined to increase speedily with better research inputs and proficient management of the farming sector. As of now, India has been concerned in the export of the large amount of raw material only. For attaining the competitor benefits we have to resort to low volume high cost (value) trade through the value addition to the raw material and unfinished product. That is why it is essential to produce genetically better planting materials for ascertained consistency and
desired quality and resort to organise farming to ascertain the availability of raw material at cultivator’s end. Post harvest storage and procedure methods are to be modernised to make the value added finished products that may be directly used by the industry. Inventorisation of herbal medicines used in traditional and modern drugs for a country like India, seems to be an impossible task, where many well established congenital or conventional systems, consisting Ayurveda, Unani, Siddha, Homoeopathy, Tibetan, Amchi, Yoga and Naturopathy are used along with modern medicine for the management of the total health care system. In all these systems a large number of herbal medicines are used, although there may be some common plants. One more trouble in right categorization of plants is that the plant medicines in these therapeutically systems are recognized by their classical, Shastriya or vernacular names. It is not so easy to associate these names with acceptable scientific names. One plant species can have various vernacular classical names and one name can be imparted to various plant species.

Arabian, Chinese, Indian and other traditional systems of medicines make widespread use of near about 5000 plants. India is proud to be rich in the biological diversity, and is the tenth among all the plant rich nations of Asia; sixth as far as centres of diversity especially agro-diversity is considered. Approximately 75% of the medicines and perfumery products used worldwide are available in natural condition in India. India owns almost 8% of the estimated biodiversity of the earth with around 126000 species. This is one of the 12 mega biodiversity centre with 2 hot spots of biodiversity in Western Ghats and north-eastern region. There are around 400 families in the world of flowering plants; among them at least 315 are represented in India. According to WHO, near about 21000 plant species have the potential for being used as medicinal plants. Around 5000 species have been analysed. There are at least 121 most important plant drugs of recognized structure, and none of them is presently produced through synthetic means. For developing phyto-medicines as a main area of concern, it would be required to adopt a holistic interdisciplinary approach, and to have a scientific base for the understanding of the plant systems (Sharma, et al., 1997).

It has been accounted by the researcher that many plants have antimicrobial activities and these antimicrobial activities of medicinal plants are due to the secondary metabolites like alkaloids, flavonoids, tannins, terpenoids etc.

The growth of microorganisms can be controlled by two methods physical and chemical. These two ways are selected according to the situation. Heat, pasteurization,
freezing, radiation and filtration are the examples of such physical agents while the chemical agents are comprised of a broad category of antimicrobial elements and medicines. Antibiotic is a product produced by the other microorganisms to dilute the flourish of the microorganisms, whereas antimicrobial agent is defined as any compound either produced from natural or synthetically generated that can be applied clinically in the treatment of the bacterial infection. From this view shows some plants have healing potential; indeed they contain what we would currently classify as antimicrobial principle. Since antiquity man has used plants to treat common infectious diseases, and some of these conventional medicines are still included as part of the habitual remedies of various diseases.

Various antibiotics and other synthetic drugs have sensitization reaction and other unwanted side effects on the biological system. That is why natural products are safer because they are in more synchronization with the biological system (Atal, 1985). Traditional medicinal plants are regularly used to treat diseases (Gessler, et al., 1994). Hence, screening of medicinal plants for biological activities seems to be promising and recently, significant antiparasitic reactions have been recognized (Gessler, et al., 1994, Tahir, et al., 1999 and Wanyoike, et al., 2004).

For the search of new antimicrobials against the resistant strains of bacteria, uses of these plants derived drugs are being proven to be an important resource of traditional method across the world. Medicinal herbs have been a big source of therapeutic alternatives in Korkus from Melghat since ancient time. These herbal drugs are less expensive; they provide maximum safety and secure treatment having minimum side effects. It is of great importance to ensure the safety of its products and practice-standardization. Our ancient literature i.e. Vedas make us to learn about the introduction of these medicinal products from plants. The introduction of new antibacterial alternatives derived from plants has large benefits. In our Indian pharmaceutical system, a large number of practitioners make and provide their own methods; they need right direction in documentation and research work.

1.4. EXTRACTION

Extraction, as this word is used pharmaceutically, involves the dispersion of medicinally lively section of plant or animal tissues from the unmoving or inert particles by means of selective solvents in model extraction measures (Banoti, 1980, Abraham and Sunol, 1997 and Baser, 1999). The stuff thus procured from the plants is practically adulterated liquids, semisolids or powders planned only for oral or external use. These comprise classes
of preparations documented as decoctions, solution extracts, infusions, pilular (semisolid) extracts and crushed extracts. Such preparations generally have been identified as galenicals, named after Galen, the 2nd century Greek doctor. Consistent extraction measures regarding drugs are to get the therapeutically required segment and to get rid of the unmoving material by treatment with the selective solvent known as menstruum. The extract thus gained may be well set for use as a medicinal means in the form of tinctures and fluid extracts, it may be further processed to be made in any quantity form such as pills or capsules, or it may be broken up into various individual chemical entities such as ajmalicine, hyoscine and vincristine, these are modern drugs.

Successful separation of botanical compounds from plant material is mainly reliant on the type of solvent used in the extraction method (Lin, et al., 1999). Several studies have been undertaken comparing the use of a range of solvents as extractants in the screening of a range of plants. Mostly used are acetone, methanol, ethanol and water, with varying results (Cáceres, et al., 1993, Eloff, 1998, Fyhrquist, et al., 2002, Griggs, et al., 2001, Masika and Afolayan, 2002, Pillay, et al., 2001, Portillo, et al., 2001 and Somchit, et al., 2003). According to Eloff (1998), acetone is a very valuable extractant. Studies have suggested that water is not an extremely efficient solvent for the extraction of the active compounds from plants, but it is generally used by conventional healers for preparation of medicines (Eloff, 1998 and Shale, et al., 1999). Alcohols are also used as they are fairly economically and substantially available (Louw, et al., 2002). Methanol has also publicized to give the best results in some studies and is often the solvent of choice (Griggs, et al., 2001, Lin, et al., 1999, Masika & Afolayan, 2002, Obi, et al., 2002 and Taylor, et al., 1995).

1.5. CHEMICAL FINGERPRINTING

The standardization of herbal drugs and a preparation thereof, is not just a methodical process; it does not end with the recognition and attempt of an active theory. It embodies overall information and controls that are required to assure reliability of composition.
1.5.1 Phytochemical Screening

The phytoconstituents are accountable for the pharmacological screening in the existence of phytochemical constituents. The petroleum-ether extract and ethanolic extract are subjected to initial qualitative chemical examination. Standard techniques were used for initial phytochemical screening of the extract. They were wide studied to know the phytoconstituents in the extract (Kokate, *et al.*, 2007 and Khandelwal, *et al.*, 2004), and it was found that extract contains carbohydrate, glycosides, proteins, steroid, amino acids, tannins and flavonoids.

1.5.2 Thin layer chromatography (TLC)

Thin layer chromatography (TLC), also called as planar chromatography, is a frequently established and broadly used separation procedure that is more than 65 years old. This practice is very simple, cost efficient, flexible, and can be used in all laboratories around the world. It can be simply personalized to the given circumstances of qualitative, quantitative or preparative partition (Forni, 1980). Even though the great range and complete automation of the procedure, it still lags behind the other chromatographic techniques, when it comes to its use as systematic technique. However, there is no replacement of this technique when circumstances necessitate qualitative analyses of the plant extracts. TLC has nearly become essential for the standardization of plant resources, be it the fingerprint profiling or analysis of an indicator. The benefits of this technique over the other analytical techniques are various when handling plant materials. The samples can be enforced exclusive of undertaking tiresome, time-taking processes of sample preparation. The loss in sensitivity is far remunerated by the increase on various fronts including easiness of assays, numerous sample analyses and minimum price per sample (Sargenti and Vichnewski, 2000).

The two major uses of TLC in the standardization of plant materials consist of fingerprint profiling for the analysis of chemical ingredients of a drug and quantitative investigation of markers in plant drugs. A typical TLC method converge sample preparation, selection of the chromatographic layer and the movable stage, sample use, development and drying of the plate, derivatization (if required) and chromatogram estimation.

1.5.3 High pressure liquid chromatography (HPLC)–Chromatograms

High pressure liquid chromatography (HPLC) is largely used by chromatographers and by the pharmaceutical manufacturing for the accurate and definite assessment of chemicals and drugs of mixed nature. The systematic scale-up from analytical to preparative
and growth scale further serves medicinal and aromatic plant industry in the separation and cleansing of phytomolecules of therapeutic and industrial awareness. Due to the usual raise in the requirement for phytomolecules, the importance of process-scale HPLC as a purification tool is increasing (Bouchet, et al., 2000, Brandt and Kueppers, 2002 and Merghem, et al., 2004).

Innovations in micro-analytical to preparative HPLC played a vital role in the improvement of natural product chemistry. HPLC is used usually in phytochemistry to lead the preparative-scale segregation of natural products and to handle the vital clarity of the segregated compounds. The growth of hyphenated techniques related to this competent parting technique in the past 20 years has provided prevailing new tools such as LC/UV-photodiode array recognition, LC/mass spectrometry (LC/MS) and LC/ NMR. The combination of high separation effectiveness of HPLC with these various detectors has been used for the acquisition of data on an LC peak of notice within a complex mixture (Pavli, et al., 2004). In view of this, attempts have been made to segregate the most active standards and other compounds which are used as a chemical marker.

1.6. BIOEFFICACIES

Plant and their extracts have been used for centuries as solutions for the use or improvement of ailment and various surveys have established the effect of efficient antimicrobial substances in plant species.

1.6.1. Antimicrobial efficacy

An anti-microbial is a substance which kills or inhibits the growth of microorganisms, such as bacteria, fungi, or protozoans. Antimicrobial drugs also kill microbes (microbicidal) or put a cap on the development of microbes (microbiostatic). Disinfectants are antimicrobial compounds used on non-living objects or outside the body.

The account of antimicrobials starts up with the observations of Pasteur and Joubert, they retraced that one kind of bacteria could stop the development of another. They didn’t know at that time that the cause one bacterium failed to cultivate was that the other bacterium was producing an antibiotic. Technically, antibiotics are only those materials which are produced by one microorganism that destroy, or stop the increase of another microorganism. Of course, in today's ordinary usage, the expression antibiotic is used to consign to almost any
drug that attempts to get rid of bacterial infection from your body. Antimicrobials consist of not only antibiotics, but unnaturally created compounds as well.

The discovery of antimicrobials like penicillin and tetracycline paved the way for improved health of millions across the globe. Prior to penicillin became a feasible medical treatment in the early 1940s, no real or exact cure for gonorrhoea, strep throat, or *pneumoniae* existed. Patients with contaminated injuries often had to have removed wounded limb, or face death from this contamination. At present, most of the infections can be treated normally with a small portion of antimicrobials.

However, with the advancement of antimicrobials, microorganisms have modified and become very resistant to the prior antimicrobial agents. The old antimicrobial knowledge was based on either toxicity or heavy metals, that may not have killed the microbe methodically, allowing the microbe to live out, change, and become resistant to the toxicity and/or heavy metals.

Antimicrobial nanotechnology is a brand new addition to the battle against ailment causing organisms, replacing heavy metals and/or toxins, and may someday be a feasible substitute.

Contaminations obtained during a hospital visit, are called "hospital acquired or obtained infections" or nosocomial infections. Consequently, when the infectious disease is acquired in the non-hospital surroundings it is considered "community acquired".


### 1.6.2. Antiviral efficacy

Antiviral drugs are a collection of medication used deliberately for treating viral infections. Similar to antibiotics, specific antiviral are used for particular viruses. They are relatively risk-free to the host, and subsequently can be used to treat infections. They should be differentiated from viricides, which dynamically hinder virus particles exterior to body. Mainly antiviral at present obtainable are intended to help deal with HIV; herpes viruses, best predictable
for causing cold sores and genital herpes, but actually causing a broad range of diseases; hepatitis B and C viruses, which can cause liver cancer, and influenza A and B viruses. Researchers are now working to enlarge the range of antiviral to other families of pathogens.

Antiviral drugs work by inhibiting the virus earlier than it enters the cell, stopping it from reproducing, or, in some cases, preventing it from exiting the cell. However, like antibiotics, viruses may grow to oppose the antiviral drug.

### 1.6.3. Antifungal efficacy

An antifungal drug is medication used to treat fungal infections such as athlete's foot, ringworm, candidacies (thrush), severe universal infections such as cryptococcal meningitis, and others.

Antifungal works by exploiting differences among human and fungal cells to destroy the fungal creature with no dangerous effects on the host. Unlike bacteria, both fungi and humans are eukaryotes. Therefore, fungal and human cells are alike at the molecular point, but its structure is more complex to determine a goal for an antifungal drug to attack that does not exist in the infected creature. As a result, there are often side effects of some of these drugs. Some of these side effects can be severe if the drug is not used correctly.

### 1.7. Antibiotics

Antibiotics are usually an old technique to treat bacterial infections. The toxicity to humans and other animals from antibiotics is commonly measured to be low down. On the other hand, long-lasting use of definite antibiotics can decrease the numeral of gut flora, which can contain a negative effect on health. A number of researchers suggested that, for the duration of or after long-lasting antibiotic use, one should keep away from pro-biotic and eat sensibly to replace damaged gut flora.

The word antibiotic originally described only those formulations extracted from living organisms, but at present it also includes synthetic antimicrobials, such as the sulphonamides.

The detection, development, and medical use of antibiotics throughout the 20th century have reduced considerably the mortality from bacterial contaminations. The antibiotic age began with the pneumatic appeal of nitro-glycerine drugs, followed by a “golden” age of innovation from concerning 1945 to 1970, when a figure of structurally diverse, extremely proficient agents were innovated and developed. On the other hand, since 1980 the coming of new antimicrobial agents for scientific use has reduced, in part because of
the massive cost of developing and testing new drugs. Parallel to this there has been an alarming addition to bacterial resistance to lively agents.

Antibiotics are the most repeatedly used drugs. For example, 30% or supplementary hospitalized patients are treated with single or more courses of antibiotic treatment. However, antibiotics are also among the drugs frequently distorted by physicians, e.g. practice of antibiotic agents in viral respiratory tract infections. The ordinary effect of widespread and ill-advised use of antibiotics has been the emergence of antibiotic-resistant pathogens, consequential in a severe danger to universal community health. The resistance problem stress that an altered effort be made to look for antibacterial agents successful in opposition to pathogenic bacteria resistant to current antibiotics. One of the possible strategies in the direction of this objective is the rational localization of bioactive phytochemicals.

Exploration of new sources of antibiotics is a universal challenge preoccupying research institutions, pharmaceutical companies and academia, since many infectious agents are becoming very opposing to the synthetic drugs (Latha and Kannabiran, 2006). One of the ways to check antibiotic opposition of pathogenic species is by applying new compounds that are not based on existing synthetic antimicrobial agents. Trouble of resistance and environmental depletion and contamination linked with illogical use of conventional medicines have developed in nature as a source of very efficient and safe substitute in the supervision of human infections (Chah, et al., 2006). During the last decade, growth of new antimicrobial drugs has slowed down while the frequency of resistance has amplified.

1.8. PROBLEM STATEMENT

Plants and plant extracts have been used for the cure of skin disorders for centuries. Because of growing resistance to antibiotics of many bacteria, plant extracts are now used as antiseptics and antimicrobial agents. Staphylococcal skin infections are ordinary because they are nearly always present on the skin. Most bacterial infections of the skin have caused Skin diseases which can be produced by a range of microbes and the skin is a haven for many microbes. The skin is open to a wide range of biological, chemical and physical attacks. Among them is solar ultraviolet (UV) radiation, and following UV exposure, reactive oxygen species (ROS) are formed and are believed to be basically accountable for skin damage, which includes erythematic, photo ageing and cancer.
Rajasthan is a state which shows different regions with different biodiversities. For example- Abu region, Swaimadhopur, Udaipur, Banswara region & Jaisalmer Bikaner region. All these regions show different biodiversities, due to that a large variety of plants, with different families & species are present here, which makes Rajasthan a satisfactory place for research oriented work on medicinal plants.
1.9. **GYMNEMA SYLVESTRE R. Br. (GURMAR)**

1.9.1. Classification

<table>
<thead>
<tr>
<th>Botanical name</th>
<th>Gymnema sylvestre R. Br.</th>
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</thead>
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<tr>
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<tr>
<td>English name</td>
<td>Gymnema, Cowplant</td>
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<tr>
<td>Part used</td>
<td>Whole plant</td>
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1.9.2. Scientific Classification

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<tr>
<td>Species</td>
<td>Gymnema sylvestre R. Br.</td>
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<tr>
<td>Common Name</td>
<td>Miracle fruit, gymnema, cowplant, Australian cowplant, gurmari, gurmarbooti, gudmar and meshasringa.</td>
</tr>
</tbody>
</table>

1.9.3. Introduction

*G. sylvestre* is a woody climbing plant that grows in the tropical forests of central and southern India. It is also known as Madhunashini, Gurmarbooti, Meshashringi (Bone, 2002).

The leaves of gudmar are used medicinally, for its unique property to directly mask the tongues ability to taste sweet foods; at the same time suppresses glucose absorption from the intestine. This is the reason it is known in Hindi as gudmar, or "destroyer of sugar". It is traditionally used in formulas to control blood sugar levels in the body. Chewing the leaves suppresses the sensation of sweet. This effect is attributed to the presence of the eponymously named gymnemic acids. *G. sylvestre* has been used as a natural treatment for diabetes for nearly two millennia. Active ingredients are found in leaves and the roots.

1.9.4. Distribution and history

Mostly it is grown in India, China, Indonesia, Japan, Malaysia, Srilanka, Vietnam and South Africa. *G. sylvestre* is an herb native to the tropical forests of southern and central
India where it has been used as a natural treatment for diabetes for nearly two millennia. Historically, *G. sylvestre* has been used to treat conditions ranging from malaria to snake bites. Sushruta, the classic book on Ayurveda, describes *G. sylvestre*, as a destroyer of 'Madhumeha' (glycosuria) and other urinary disorders. This herb has been given the name of 'gurmar' meaning 'sugar-destroying,' because of its property of abolishing the taste of sugar and "mesbasringi" meaning 'ram's horn' with relation to the shape of its fruits. It has been used in India as a remedy against this condition with success.

1.9.5. **Medicinal and toxic aspects**

The active ingredients are thought to be the family of compounds related to gymnemic acid: purified gymnemic acids are widely used as experimental reagents in taste physiology and have also an anti-diabetic effect in animal models, they reduce intestinal transport of sugars and fatty acids (Hellekant, *et al.*, 1998, Sugihara, *et al.*, 2000, Luo, *et al.*, 2001 and Wang, *et al.*, 1998.) Historically, the leaves were used for stomach ailments, constipation, water retention, and liver disease; however, these claims are not supported by scientific studies (Shanmugasundaram, *et al.*, 1981). Gymnemic acids have antidiabetic, antiglycemic, and anti-inflammatory activities. The antidiabetic array of molecules has been identified as a group of closely related gymnemic acids, which have been successfully isolated and purified from the leaves of *G. sylvestre*. Later, phytoconstituents of *G. sylvestre* were isolated, and their chemistry and structures were studied and elucidated.

1.10. **ADIANTUM LUNULATUM BURM. f. (HANSRAJ)**

1.10.1. **Classification**

<table>
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<th>Botanical name</th>
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<td>Hindi name</td>
<td>Hansraj</td>
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<tr>
<td>English name</td>
<td>Maiden hair</td>
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<tr>
<td>Part used</td>
<td>Whole plant</td>
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1.10.2. **Scientific Classification**

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<tr>
<td>Family</td>
<td>Pteridaceae (Adiantaceae)</td>
</tr>
<tr>
<td>Genus</td>
<td>Adiantum</td>
</tr>
</tbody>
</table>
Species : *Adiantum lunulatum* Burm. f.

Common name : Brahmadani, Chitrapada, Dharttarashtrapadi, Ghritamandalika, Godhangri, Godhapadika, Hamsapadika, Hansaghri, Hansavati.

1.10.3. Introduction

*A. lunulatum* is a cosmopolitan fern belonging to the family of Adiantaceae, and genus *Adiantum*. In India it is found very generally in South in plains and lower slopes of the hills and in the North along the foot of the Himalayas from East to West at an altitude of 1000-3000 feet.

The species of *Adiantum* is exploited under the trade name hansraj, hanspadi, myurshikha. As the name indicates, the plant is described as the one, similar to the feet of swan (Singh and Panda, 2005). The entire plant of this species is used as medicine in Ayurveda, Siddha and Unani (Upreti, *et al*., 2009).

1.10.4. Distribution and history

*A. lunulatum* is a vertical or slightly decumbent fern, about 15 cm high confined to tropical moist deciduous forests and all over greater part of India up to an altitude of 1200m. It prefers humus-rich, wet, clay, sand, acid-rich, loam soils, found commonly in varied habitats and growing successfully in crevices of stony walls and hilly slopes (Shaikh and Dongare, 2008).

Adiantum can be acclimatized to different types of habitats all along with change in morphological look due to differences in soil parameters and different habitats. The growth of *A. lunulatum* is affected, and this plant has variations in growth forms which can be correlated with its ecotypes showing correlation between its habitat and growth forms (Shaikh and Dongare, 2008 and Anonymous, 1985). The plant is native to tropics, commonly found at Mount Abu, Gwaparnath, Ajmer and Menal of Rajasthan, Ceylon (Chatterjee and Pakrashi, 1994) and Burma (Kirtikar and basu, 1987).

1.10.5. Medicinal and toxic aspects

This Indian medicinal plant is used as medicinal agent throughout the country. In ayurvedic medicine the plant comprises the drug hansraj and is used as an external application to relieve burns, poisonous affections and skin diseases, including leprosy (Rout, *et al*., 2009). It is also included in several important compound preparations. The fronds,
made into a plaster, are applied to chronic gout and the other swellings and to chronic tumors; the juice of the fresh plant is applied to promote healing of wounds and abscesses. Burnt with oil, the fronds are used as an application to soothe itches.

The roots of this plant are considered carminative, tonic, diuretic and useful for treating bilious complaints. They are also prescribed for strangury and for fever due to elephantiasis. A decoction of the roots is used to treat throat infections and febrile conditions in children and to treat discharge of blood in the urine (haematuria) mostly in south western Orissa. These people also use the root paste as an external application to promote healing of bone fracture (Karthik, et al., 2011).

The plant shows antibacterial, antiviral, contraceptive and hypoglycaemic properties. The plant is fairly effective in treating kidney stones, bladder gravel, digestive problems, indigestion, bronchitis, hepatitis and jaundice, sore throat and balding. This is also useful in curing fever, boils and sores. It shows very effective results in the treatment of various reproductive disorders such as general menstrual problems, abnormal uterine bleeding, excess menstrual flow, menstrual discomfort and late menses. hansraj plant is a good remedy for general respiratory problems like bronchitis, pertussis, and cough with sticky phlegm, excess mucous and coughing blood. It has also used in the treatment of tumors, rabies and stings.

Fig.1.1. Plant of *Gymnema sylvestre* R.Br.  
Fig.1.2. Plant of *Adiantum lunulatum* Burm. f.
Fig. 1.3. Plant of *Bryonia lacinosa* L.

Fig. 1.4. Plant of *Tectona grandis* L. f.

Fig. 1.5. Plant of *Viola odorata* L. f.

Fig. 1.6. *Aegle marmelos* L. (bael)

Fig. 1.7. *Oroxylum indicum* L.

Fig. 1.8. *Gmelina arborea* L.
Fig. 1.9. *Stereospermum suaveolens* L.

Fig. 1.10. *Premna integrifolia* L.

Fig. 1.11. *Desmodium gangeticum* (L.) DC.

Fig. 1.12. *Utraria lagopoides* L.

Fig. 1.13. *Solanum indicum* L.

Fig. 1.14. *Solanum xanathocarpum* SCHRAC & WENDLE
Fig. 1.15. *Tribulus terrestris* L.

Fig. 1.16. Plant of *Solanum xanthocarpum*
SCHRAC&WENDLE

Fig. 1.17. Fruit of *Withania coagulans* (Stocks) Dunal
1.11. **BRYONIA LACINIOSA L. (SHIVLINGI)**

1.11.1. Classification

Scientific Name : *Bryonia laciniosa* L.

Hindi name : Shivlingi

English name : Lollipop plant

Part used : Fruit and stem

1.11.2. Scientific Classification

Kingdom : Plantae

Class : Magnoliopsida

Order : Cucurbitales

Family : Cucurbitaceae

Genus : *Bryonia*

Species : *Bryonia laciniosa* L.

Common Name : Bajguriya, Shivlingi

1.11.3. Introduction

Shivlingi (*B. lacinosa*) is a commonly found herb in Patalkot valley. It belongs to family Cucurbitaceae. In English, it is known as Lollipop plant. This herb is a twine. Seeds of this plant resemble Shivling (Sex organ of Lord Shiva in Hindu mythology).

1.11.4. Distribution and history

*B. lacinosa* is mostly found throughout India from Himalayas to Ceylon, Mauritius, tropical Africa, Malaya, Phillippines and Australia. The plant is an under shrub climber having tendrils. The plant has a bad smell. The plant as a whole is collected after fruiting. It is bitter and tonic. The leaves are applied topically for inflammation.

Generally the herb is seen in the slope of the valley but it occurs in many villages in the Patalkot valley, Gond and Bharia tribes of this valley worship this plant. According to them, this herb is a boon for the childless parents. The herbal healers (Bhumkas) prepare certain combinations of herb and prescribe it to the needy persons. Interestingly, Bhumkas in Harra-Ka-Chhar village in Patalkot prescribe the seeds of this herb for conceiving male babies. In Gaildubba, traditional healers make a combination of shivlingi seeds with Tulsi (*Ocimum basilicum*) leaves and mix it in Jaggery (the traditional unrefined sugar used in India) and give it to the lady who is not conceiving baby due to any reason. Shivlingi is a
twiner and can be well identified by its flower/ fruits/ seeds. The foul and just different sort of smell of the plant is also a way of identifying it.

The plant bears flower during October to November. In some pockets, the tribal ladies collect leaves of the plant and prepare curry. They say that it works as a tonic. Sometimes, they mix the leaves of this plant with Besan (Gram flour, made by milling split Bengal gram into fine flour) and roast it. This is really a tasty tribal delicacy. According to the tribal healers, this curry should be eaten by ladies during the pregnancy period. The baby thus delivered remains healthy forever. There has not been much studies carried out so far on this aspect but there is a greater need to evaluate this plant for proving the potential of conceiving babies. As per Ayurveda, leaves and seeds of shivlingi are used for controlling fevers and also as tonic. This is also useful in inflammation and skin irritations.

1.11.5. Medicinal and toxic aspects

The family Cucurbitaceae has includes several important medicinal plants with wide ranging pharmacological and biological activities and interesting chemistry. In India, this family is reported to have 106 species under 34 genera. *B. diocia*, commonly known Brony root is used as cathartic and diuretic and also recommended for Pleurisy, Whooping cough and bronchitis. *B. alba* contains a group of triterpenoidal bitter antitumor properties known as cucurbitacins (Wallis, 2006). Traditional Medicinal Uses: According to Ayurveda, the plant is hot and pungent. Its leaves are used for inflammations.

Plant: Bitter, aperient and tonic, used in bilious attack and fever with flatulence.
Seed: Applied to inflammation.
1.12. TECTONA GRANDIS L. f. (SAGWAN)

1.12.1. Classification

Scientific Name : Tectona grandis L. f.
Hindi name : Sagwan
English name : Teak
Part used : Leaf and stem

1.12.2. Scientific Classification

Kingdom : Plantae
Division : Magnoliophyta
Class : Magnoliopsida
Order : Lamiales
Family : Verbenaceae
Genus : Tectona
Species : Tectona grandis L. f.
Common Name : Sagaun, sagen, sagvan, sagwan, segun hagwan, hag, nakta, sagun.

1.12.3. Introduction

Sagwan or Teak (T. grandis) is a giant and handsome deciduous tree. Its botanical family is verbenaceae. It is called sagen, saigon, saj, taku, kayum, etc. in home languages. It grows fine in warm climate and well-drained soil. It grows in Myanmar and central and southern India and is propagated artificially in the Indo Gangetic plains, and the foothills from Bengal to Haryana and Punjab on comparatively lesser scale, especially as an avenue tree. It grows gladly in low height plains to the foothills up to 800 m.

1.12.4. Distribution and history

T. grandis is indigenous to the following counties India, western peninsula, Burma, Konkani, Myanmar, Thailand and Laos and exotic to Antigua and Barbuda, Bangladesh, Barbados, Brazil, Brunei, Cote d'Ivoire, Cuba, Dominica, Dominican Republic, Cambodia, China, Ghana, Grenada, Guadeloupe, Jamaica, Kenya, Malaysia, Mauritius, Nepal, Nigeria, Pakistan, panama, Philippines, Puerto Rico, South Africa, Sri Lanka, St Lucia, St Vincent and the Grenadines, Tanzania, Togo, Trinidad and Tobago, Uganda, Vietnam, United States of America and Virgin Islands (US).
Its natural distribution is in Southeast Asia, from the Indian subcontinent through Myanmar and Thailand to Laos. In early times its farming was done by Hindu settlers, possibly in the 7th century. It is supposed that teak was introduced from Java to India 400-600 years ago. \textit{T. grandis} was introduced to both East and West Africa and 'Trinidad teak' developed into particularly well known in the Caribbean region. It is plant for timber or ornament and in botanical gardens. \textit{T. grandis} was by far the most key export timber in Thailand until all logging in natural forests was banned in 1989.

1.12.5. Medicinal and toxic aspects

Wood: It is used for treatment of Sedative, Anthelmintic, piles, in the treatment of gravid uterus, Leucoderma, dysentery, headache, burning pain over liver region, antiinflammatory, anodyne, vermifuge, depurative, laxative, ophthalmic, vitiated conditions of pitta & kapha, dyspepsia, flatulence, cough, skin diseases, leprosy, neuralgia, arthritis, hyperacidity, menorrhagia, leucorrhoea, abortion, hemorrhoids, antibilious and lipid disorders. Paste made from the wood is used as a diuretic, stimulant, hepatic, astringent relief from tooth ache. Wood ash is applied to the swollen eyelids to strengthen the eye sight. Oily product obtained from the wood chips is applied to eczema.

Root: It is used in the treatment of anuria, urine retention.

Leaves: It is used in the treatment of thatching, haemostatic, depurative, antiinflammatory, vulnery, leprosy, skin diseases, puritus, stomatitis, indolent ulcers, hemorrhages, Haemoptysis, vitiated conditions of pitta.

Seed: It is used in the treatment of Diuretic, emollient, demulcent, prurities, skin diseases, and in vitiated conditions of vata. Oil obtained from seeds promotes the growth of hair and is useful in eczema, ringworm and to check scabies.

Bark: It is used in the treatment of Bronchitis, Constipation, hyperacidity, dysentery, verminosis, burning sensation, Anthelmintic, Depurative, diabetes, leprosy, skin diseases, leucoderma, headache, piles, laxative, expectorant, anti-inflammatory, indigestion, expels worms from the body and in vitiated conditions of pitta.

Flowers: It is used in the treatment of Bronchitis, biliousness, diuretic, depurative, urinary discharge, anti-inflammatory, burning sensation, skin diseases, strangury dipsia,
leprosy, diabetes and vitiated conditions of pitta and kapha. Oil obtained from the flowers promotes growth of hair and useful in scabies, eczema. Infusion of flowers is taken in congestion of liver.

Fruits: It is used in the treatment of diuretic, demulcent, strangury, vesicle calculi, pruritus, stomatitis.

All the parts of the plant seeds, flowers, fruits, wood, bark, roots, and leaves are useful either alone or along with other plants for many applications (Khare, 2007, Kirtikar and Basu, 2006, Krishnan, 2006, Kurian, 2007, Nadkarni and Nadkarni, 1908 and Longman, 1996).

1.13. **VIOLA ODORATA L. (BANPASHA)**

1.13.1. **Classification**

<table>
<thead>
<tr>
<th>Botanical name</th>
<th><em>Viola odorata</em> L.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hindi name</td>
<td>Banpasha</td>
</tr>
<tr>
<td>English name</td>
<td>Sweet Violet</td>
</tr>
<tr>
<td>Part used</td>
<td>Whole plant</td>
</tr>
</tbody>
</table>

1.13.2. **Scientific Classification**

- **Kingdom**: Plantae
- **Order**: Malpighiales
- **Family**: Violaceae
- **Genus**: Viola
- **Species**: *Viola odorata* L.
- **Common name**: Banpasha, Banafsa, Banafsha or Banaksa.

1.13.3. **Introduction**

*V. odorata* is a type of the genus Viola native to Europe and Asia, but has also been introduced into North America and Australasia. It is usually identified as Wood Violet (Asakawa and Asakawa, 2001) Sweet Violet, English Violet, Common Violet, or Garden Violet.
The herb is known as Banafsa, Banafsha or Banaksa in India, where it is frequently used as solution for sore throat and tonsilitis. The sweet smell of this flower has been used in the manufacture of many cosmetic fragrances and perfumes. The French are also recognized for their violet syrup, most commonly called violets. In the United States, this French violet syrup is used to make violet scones and marshmallows.

1.13.4. Distribution and history

*V. odorata* is mostly found in many regions of the world, e.g. South and eastern Africa, South America, France, Italy, Australia and New Zealand. *V. odorata* is cultivated all over the world as an ornamental plant.

1.13.5. Medicinal and toxic aspects

*V. odorata* leaves are emetic, purgative, expectorant, emollient, diaphoretic; they are used as dressing for burns, in South Africa leaves are chewed as anticancer. Roots are emetic and are used as expectorant; the alkaloid odoratine from roots is hypotonic. *V. odorata* flowers are emetic, diaphoretic; its febrifuge is used in bilious problems, lung troubles and cough, kidney and liver diseases and also used to flavor breath fresheners. The oil extracted from the flowers and leaves, is used in perfumery. The leaves are edible and can also be cooked, and are a nice addition to soups or stews where they help to thicken them in much the same way as okra can be used. The plant has a strong folk reputation in the treatment of cancer and whooping cough. It also contains salicylic acid, which is used to make aspirin, and is therefore effective in the treatment of headaches, migraine and insomnia.
1.14. DASHMOOL

1.14.1. Introduction

Dashmool is a combination of ten ayurvedic herbs; combine of *Aegle marmelos* L., *Oroxylum indicum* (L.) Vent, *Gmelina arborea* L., *Stereospermum suaveolens* L., *Premna integrifolla* L., *Desmodium gangeticum* (L.) DC., *Uricia lagopoides* L., *Solanum indicum* L., *Solanum xanthocarpum* SCHRAC & WENDLE and *Tribulus terrestris* L. It is used in pacifying vata dosha. The herbs are used in making certain therapeutic massage oils, and are also used in the form of tea to treat certain conditions. In the Ayurvedic system of medicine it is used as analgesic, antiarthritic, against cough, rheumatism, etc. (Anonymous, 1992).

*A. marmelos* (bael) belonging to the family Rutaceae (also known as Bengal quince, stone apple), is a species of tree native to India. It is present throughout Southeast Asia as a naturalized species. The tree is considered to be sacred by Hindus. Its fruits are used in traditional medicine and as a food throughout its range.

*O. indicum* (syonaka) is a species of flowering plant belonging to the family Bignoniaceae. *O. indicum* is native to the Indian subcontinent, in the Himalayan foothills with a part extending to Bhutan and southern China, in Indo-China and the Malesia ecozone. It is visible in the forest biome of Manas National Park in Assam, India. It is found, raised and planted in large number in the forest areas of the Banswara district in the state of Rajasthan in India.

*G. arborea* (kasmari) belonging to the family Lamiaceae, locally known as Gamhar, is a fast growing deciduous tree, occurring naturally throughout greater part of India at altitudes up to 1500 meters. It also occurs naturally in Myanmar, Thailand, Laos, Cambodia, Vietnam, and in southern provinces of China, It is also planted in gardens and avenues.

*S. suaveolens* (patala), belonging to the family Bignoniaceae, plants have been an exemplary source of medicine. Ayurveda and other Indian literature mention the use of plants in treatment of various human ailments. India has about 45 000 plant species and among them, several thousands have been claimed to possess medicinal properties. *S. suaveolens* are known for their antimicrobial, antiprotozoal, and anti-inflammatory, puerperal fevers and infections of the brain.

*P. integrifolia*, belonging to the family Lamiceae, is an important constituent of famous herbal formulation “Dashmula” of Indian Ayurvedic system of medicines. The plant is known to possess hypoglycaemic, anti-inflammatory, antiarthritic and broad-spectrum
antimicrobial activities due to the presence of several diterpenoids and spermine alkaloids in its decoction.

*D. gangeticum* (shalaparni), belonging to the family Fabaceae, is sweet in taste and mildly warming in action. It is calming, strengthening and anti-inflammatory. It restores balance to the system when other herbs fail.

*U. lagopoides* (prsniparni), belonging to the family Papilionaceae, is abortifacient, laxative, aphrodisiac; used in remittent fever, asthma, dysentery and for the treatment of inflammation in the chest. Decoction of the leaf is used for diarrhoea. An Ayurvedic drug consists of this plant is used in rheumatism, fever, bleeding piles, catarrh and scorpion-sting. Shoot extract showed oxytocic and anti-implantation activity.

*S. indicum* (brhati), belongs to the family Solonaceae, root forms one of the Laghupancamula meaning literally, minor five roots, of Dasamula kvatha (decoction of ten roots), one of the widely prescribed formulation of Ayurveda. Maharsi Charaka has categorized brhati as kanthya. It is beneficial to throat.

*S. xanathocarpum* (kantakari), belonging to the family Solanaceae, forms one of the important plants in Hindu medicine. It is pungent, bitter, digestive, diuretic, alterative, astringent and anthelmintic. It is used in fever, cough, flatulence, costiveness and heart disease. In practice the drug was generally combined with other expectorants, demulcents and aromatics. Fumigation with the vapour of the burning seeds of this plant is in high repute to cure toothache. When smoked like tobacco, the natives believed that the smoke killed the insects, which they assumed caused the pain. In Bengal the plant was used as a diuretic in dropsy. The root paste was utilised by the Mukundara tribals of Rajasthan for the treatment of hernia.
**1.14.2. Medicinal and toxic aspects**

They are particularly beneficial to the uterus and lungs, while researches have also indicated that a strong extraction of Dashmool is effective in managing diabetic retinopathy and diabetic neuropathy. Moreover, Dashmool is an anti-inflammatory, and is effective in treatment of bronchitis, headache, cough, drowsiness, weakness, impotence, and digestive problems.

Dashmool oil is easily applied to various parts of the body as a complete healing massage. Dashmool oil is used in conditions such as rashes, or skin conditions caused by vata and kapha.

Due to excessive healing properties, with hardly any side effects associated with it, Dashmool oil can be used safely by one and all. Among the major ingredients that go into the making of Dashmool-bala oil are Gmelina ribes S. surratense, D. gangeticum, O. indicum, U. picta, S. indicum, S. suaveolens, C. cordifolia, A. marmelos, P. mucronata, natural sesame oil is its base.

**1.15. SOLANUM XANTHOCARPUM SCHRAC & WENDLE (PASARKATELI)**

**1.15.1. Classification**

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Solanum xanthocarpum SCHRAC &amp; WENDLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hindi name</td>
<td>Kateli, Kateri, Rengani</td>
</tr>
<tr>
<td>English name</td>
<td>Yellow berrid night shade</td>
</tr>
<tr>
<td>Part used</td>
<td>Whole Plant</td>
</tr>
</tbody>
</table>
1.15.2. Scientific classification

Kingdom : Plantae  
Division : Magnoliophyta  
Class : Magnoliopsida  
Order : Solanales  
Family : Solanaceae  
Genus : Solanum  
Species : Solanum xanthocarpum SCHRAC & WENDLE  
Common Name : Yellow-Berried Nightshade, Choti Katheri, Kantkari, Kateli.

1.15.3. Introduction

*S. xanthocarpum* has effective use in folk medicine and Ayurveda. It is a commonly rising permanent herbaceous wild plant with bright green leaves and zig-zag stem, mostly grown in the arid region. It is said that the plant has solasonine in its diverse parts, which is responsible for its medicinal value (Oudhia, 2007).

1.15.4. Distribution and history

*S. xanthocarpum* is mostly found in Southeast Asia, Malaya and tropical Australia. It is found throughout India in plains from beach to hills up to 1000 m high. This plant shaped one of the significant plants in Hindu medicine. It is one of the ten roots, the Dhasamool. It is pungent, diuretic, alterative, bitter, digestive, astringent and anthelmintic. It is used in fever, cough, flatulence, and heart disease. In practice the drug is normally mixed with other expectorants, demulcents and aromatics. Fumigation with the vapour of the flaming seeds of this plant is in high repute to cure toothache. When smoked like tobacco, the natives supposed that the smoke killed the insects, which they thought caused the pain. In Bengal the plant was used as a diuretic in dropsy. The root paste was utilised by the Mukundara tribals of Rajasthan for the healing of hernia.

1.15.5. Medicinal and toxic aspects

*S. xanthocarpum* (Yellow-berried nightshade) spiny, circulate herb is found throughout India. Root is an expectorant used in Ayurvedic medicine for cough, asthma and chest pain. It is also used for flatulence, sore throat, and toothache. It has excessive concentration of solasodine, a starting material for the produce of cortisone and sex hormones. Bitter fruits are used in Indian curries.
S. xanthocarpum is useful in treating worms, cold, and hoarseness of voice, fever, and dysuria, improvement of the liver, muscular pain, spleen and mineral in the urinary bladder.

Nasal direction of S. xanthocarpum is valuable in migraine, asthma and headache. Its dried fruit is used in production of cigarettes. The smoke from these cigarettes is held in the mouth cavity: as a cure for dental infections. The juice of the berries is used in curing sore throat. The fumigation of S. xanthocarpum is effective in piles. The herb paste is applied on swollen and painful joints to decrease pain and swelling in arthritis. Roots and seeds are used as an expectorant in asthma, cough and pain in chest. The decoction of the root is used with honey, is a cure for cough. The root paste mixed with lemon is a cure for snake and scorpion bites. Its stem, flowers and fruits, being bitter and carminative, are used for relieving burning sensation foot. S. xanthocarpum fruits also make easy seminal ejaculation to alleviate worms, itching, and fever and to reduce fats. The fruit works as an aphrodisiac in males. Its seeds are helpful in treating asymmetrical menstruation and dysmenorrhoeal in females. The herb is valuable in the dealing of cardiac diseases associated with edema: it is sort of compost to the heart; it is as well a blood purifier.

1.16.  **WITHANIA COAGULANS (STOCKS) DUNAL (PANEERPHAL)**

1.16.1. Classification

<table>
<thead>
<tr>
<th>Botanical name</th>
<th>Withania coagulans (Stocks) Dunal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hindi name</td>
<td>Paneer phal, panirband</td>
</tr>
<tr>
<td>English name</td>
<td>Indian rennet</td>
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<td>Fruit</td>
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1.16.2. Botanical classification

<table>
<thead>
<tr>
<th>Kingdom</th>
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</tr>
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<tbody>
<tr>
<td>Order</td>
<td>Solanales</td>
</tr>
<tr>
<td>Family</td>
<td>Solanaceae</td>
</tr>
<tr>
<td>Subfamily</td>
<td>Solanoideae</td>
</tr>
<tr>
<td>Genus</td>
<td>Withania</td>
</tr>
<tr>
<td>Species</td>
<td><em>Withania coagulans</em> (Stocks) Dunal</td>
</tr>
<tr>
<td>Common name</td>
<td>Ashutosh booti, Indian rennet, panirband, vegetable rennet.</td>
</tr>
</tbody>
</table>

1.16.3. Introduction

*W. coagulans* belongs to the family of Solanaceae. Withania is a little genus of vegetation, which is dispersed in the East of the Mediterranean region and extends to South Asia. The berries of the shrub are used for milk coagulation. It is generally recognized as Indian cheese maker. In Punjab, the fruits of *W. coagulans* are used as the foundation of coagulating enzyme for clotting the milk which is called paneer.

1.16.4. Distribution and history

*W. coagulans* is ordinarily found throughout Pakistan. It is also traced in North-West India and Afghanistan. The plant is identified by altered names in different home languages, such as ‘Akri’ or ‘Puni-ke-bij’ in Hindi, ‘Tukhme-Kaknaje-hindi’ in Persian, Spicebajja in Afghan, Khamjira in Punjabi and Punir band or Punirja-fota in Sindhi (Dymock, *et al.*, 1972).

The plant is famous as ‘the cheese maker’ or ‘vegetable rennet’ for the reason that fruits and leaves of the plant are used as a coagulant. The milk coagulating property of the fruit is traceable to the pulp and husk berries which posses an enzyme which has milk coagulating activity. One ounce of the fruits of *W. coagulans* and 1 quarter of boiling water make a decoction, one table spoonful of which coagulates a gallon of warm milk in about an hour (Dymock, *et al.*, 1972).
1.16.5. Medicinal and toxic aspects

*W. coagulans* is used in dyspepsia, flatulent colic and other intestinal infections. In few parts of Pak-Indian sub-continent, the berries are used as a blood purifier. The twigs are chewed for cleaning teeth, and the smoke of the plant is inhaled for treatment of toothache. *W. coagulans* is used to cure for nervous exhaustion, disability, insomnia, wasting diseases, failure in childrens growth and impotence. Its fruits are used for liver complaints, asthma and biliousness. Its fruits are used for liver complaints, asthma and biliousness. Flowers of *coagulans* are used in the treatment of diabetes. The root is harvested in autumn and dried for later use. Some caution is advised in the use of these plants since it is toxic. Antimicrobial, anti- inflammatory, antitumor, hepatoprotective, anti-hyperglycemic, cardiovascular, immuno-suppressive, free radical scavenging and central nervous system depressant activities of the plant have been reported. The use of medicinal plants by humans is as old as the origin of the human race. *W. coagulans* is an important medicinal herb as large numbers of phytochemicals have been isolated from this, which are in use in different herbal formulations and pharmaceutical products.