CHAPTER 1

INTRODUCTION

1.1. HISTORY OF AYURVEDA
1.2. PLANTS IN TRADITIONAL MEDICINES
1.3. PLANTS AS DISEASE CURING AGENTS
1.4. ANTIMICROBIAL ACTIVITY OF GREEN PLANTS
1.5. SYMPTOMS, COMPLICATIONS AND RISK FACTORS OF BACTERIAL DISEASES
1.6. IMPORTANCE OF MEDICINAL PLANTS
1.7. PHYTOCHEMICAL SCREENING OF MEDICINAL PLANTS
1.8. BIOACTIVE COMPOUNDS
1.9. PLANTS AS ANTIOXIDANT AGENTS
1.10. ANTI TUMOUR POTENTIAL OF ARID ZONE PLANTS
1.11. ARID ZONE PLANTS
1.11.1 HYPER-ARID ZONE PLANTS
1.11.2. ARID ZONE PLANTS

1.11.3. SEMI ARID ZONE PLANTS

1.12. INTRODUCTION OF *WRIGHTIA TINCTORIA* PLANT

112.1.1. SCIENTIFIC CLASSIFICATION

1.13. DESCRIPTION OF *WRIGHTIA TINCTORIA*

1.14. USEFUL PARTS OF *WRIGHTIA TINCTORIA*

1.15. MEDICINAL USES OF *WRIGHTIA TINCTORIA*

1.17. INTRODUCTION OF *DYEROPHYTUM*

1.17.1.1. SCIENTIFIC CLASSIFICATION

1.18. MORPHOLOGY

1.19. PROBLEM STATEMENT

1.1. HISTORY OF AYURVEDA

The Ayurvedic concept appeared and developed between 2500 and 500 BC in India. The literal meaning of Ayurveda is science of life, because ancient Indian system of health care focused views of man and his illness. It is pointed out that the positive health means metabolically well-balanced human beings. According to Ayurveda, the disease evolves from the body due to external factors. It has a vast literature in Sanskrit covering all aspect of diseases, pharmacy and therapeutics.

The preparation of Ayurveda therapeutics consisted of eight sections divided into one eighty chapters and listed three hundred fourteen plants, which are used as medicines in India (Subhose *et al.*, 2005). The Indian subcontinent is a vast repository of medicinal plants that are used in traditional medical treatments (Ballabh *et al.*, 2007).

Many Westerners have long regarded the Indian systems of medicine as a wealthy source of knowledge (Subhose *et al.*, 2005). In India, around 20,000 medicinal plants have been recorded (Dev *et al.* 1997) however traditional communities are using only 7,000 - 7,500 plants for curing different diseases (Perumal *et al.*, 1998; Kamboj *et al.*, 2000).
The medicinal plants are listed in various indigenous systems such as Siddha (600), Ayurveda (700) and Amchi (600), Unani (700), Allopathy which thirty plant species for ailments (Rabe et. al., 1997). Even today, majorities of the medicines are prepared from the plant and animal products, minerals and metals etc. Major pharmaceutical industries depend on the plant products for the preparation of Ayurvedic medicines.

In the present context, the Ayurvedic system of medicine is extensively accepted and practiced not only in the Indian Peninsula but also in the developed countries such as Europe, United States and Japan. Plant derived medicines have been the first line of defence in maintaining health and combating diseases (John et. al., 1984; Hveal et. al., 1992). In the last century, roughly 121 pharmaceutical products have been discovered based on the information obtained from the traditional healers (Anesini et. al., 1993).

Chemical principles from natural sources have become much simpler and have contributed significantly to the development of new drugs from medicinal plants (Cox et. al., 1990; Cox et. al., 1994)

Biologically active compounds from natural sources have always been of great interest to scientists working on infectious diseases. Research to find out scientific evidence for claims of plants used for Indian Ayurveda system of medicine has been intensified. Detailed research on the chemistry and pharmacology of products of plant origin are much essential and this may eventually lead to the discovery of medicine that can be used in the treatment of several diseases (Dev et. al., 1997).

Moreover, these local Ayurveda preparations are scientifically evaluated and dispersed properly, our indigenous residents can be given better access to effective drug healing and improved health position (Manandhar et. al., 1985; Manandhar et. al., 1987). However, over commercial utilization of these plant (herbal) products regularly degradation of natural resources are reported to be major threats to medicinal plants in India. The aim of the present work is to understand the
knowledge of plants used for Ayurveda preparations, can be extended for future scientific investigation and justify plants as therapeutic targets.

### 1.2. PLANTS IN TRADITIONAL MEDICINES

Four thousand years ago, the medical knowledge of the Indian subcontinent was termed as Ayurveda. Ayurveda remains an important system of medicine and drug therapy in India. Plant alkaloids are the primary active ingredients of Ayurveda drugs. Today the pharmacologically active ingredients of many Ayurvedic medicines are being identified and their usefulness in drug therapy being determined. It is roughly estimated that of the discovered 17,000 species, nearly 3,000 species are used in medicinal field.

In India, many forms of alternative medicines are available for those who do not want conventional medicine or who cannot be helped by conventional medicines. Ayurveda and Kabiraji (herbal medicine) are two important forms of alternative medicine that is widely available in India.

Ayurvedic form of medicine is believed to be existent in India for thousands of years. It employs various techniques and things to provide healing or relief to the ailing patients. One of the things that Ayurveda uses is medications of plant derivation.

Ayurveda, the first prearranged system of medicine, ever evolved throughout the globe, is not mere a system dealing with healing techniques and curing diseases. It is indeed a codified science which issues definite guidelines for healthy, peaceful and happy living and maintenance and protection of physical and psychological health, with an object of achieving longevity. The system has been first and foremost developed with two basic objectives viz. protection of health and avoidance of disease in a healthy person and obliteration of diseases in diseased person. The first objective is achieved by observance of strategy related to healthy living and the second objective specifically deals with disease remedial feature. Thus it is very clear that Ayurveda is not only a restorative medical science but also is a comprehensive way of healthy living. Guidelines related to healthy or ‘swastha’ individual are termed as ‘Swastha vritta’ and regular practices are considered in relation to daily practices known as ‘Dinacaryaa’ in Ayurveda.

Many herbs and spices used in Indian cooking, such as onion, garlic, ginger, turmeric, clove, cardamom, cinnamon, cumin, coriander, fenugreek, fennel, ajowan (ajwain), anise, amchur, bay
leaf, hing (asafoetida) etc., are known to have medicinal properties. Ayurvedic medicine uses all of these either in diet or as medicine.

Besides, the many medicinal plants that are found in India (and elsewhere) are routinely used by the practitioners of Ayurveda. In India over 7,000 medicinal plant species are known to exist. Some of these medicinal plants have been featured on Indian postage stamps. The first set of stamps showing medicinal plants came out in 1997. The set had four stamps showing four different medicinal plants - Tulsi (*Ocimum sanctum*), Haridra (*Curcuma longa*), Sarpagandha (*Rauwolfia serpentina*), and Ghritkumari (*Aloe barbadensis*).

According to World Health Organization, medicinal plants are the best source to obtain a variety of newer herbal drugs. About 80% of individuals from developed countries use traditional medicine, which has compounds derived from medicinal plants. Therefore, such plants should be investigated to better understand their properties, safety and efficacy.

The use of plant extracts and phytochemicals, both with known antimicrobial properties, can be of great significance in therapeutic treatments. In the last few years, a number of studies have been conducted in different countries to prove such efficiency. Many plants have been used because of their antimicrobial traits, which are chiefly due to synthesized during secondary metabolism of the plant.

More than two decades ago, desert modified landscape trees began gaining in attractiveness in south-western landscape designs. Desert species grown from seed offered designers trees with widely varying forms and structures that would easily and naturally imitate trees found in the surrounding desert. Formal or urban landscape designs called for trees with more uniform qualities and far less varied shapes and growth habits. Such trees could not be produced if propagated from collected seeds.

A substitute to seed production is vegetative propagation (also called clonal propagation or cloning). With cloning, plant parts (typically fresh, lush, green stem growth) are treated with plant growth hormones to encourage the formation of roots. Once rooted cuttings are then grown like seedlings to produce new trees. In this way new plants, identical to the original mother plant, are produced.
Rooting plant parts insures greater consistency and reduces the need for frequent culling to remove seedlings with unwanted qualities. Cloning provides a functional method for producing large numbers of genetically identical trees with similar form, structure, flower colour, leaf pattern or any other desired quality or appearance.

The face up to in bringing cloned trees to the market has always been to select trees with the required physical characteristics (branch structure, flower colour and amount, foliage) that also obsessed sound horticultural qualities (well-distributed root mass, cold hardiness, growth rate and form) and to successfully and efficiently produce these clones on a large scale.

Careful selection and assessment of basis stock (“mother” plants) in combination with cloning techniques can improve tree performance. Without careful screening, physically attractive trees can be introduced that are, in fact, genetically vulnerable to an assortment of unanticipated problems.

Since the last decade, the rise in the collapse of chemotherapeutics and antibiotic resistance exhibited by pathogenic microbial infectious agents has lead to the screening of several medicinal plants for their potential antimicrobial activity. (Colombo et.al., 1996; Okunji et.al., 1999). With the improvement of modern medicinal technology, it is now easier to recognize specific botanical constituents and measure their potential antimicrobial activity. Many herbs contain dozens of active constituents that merge to give the plant its therapeutic value.

1.3. PLANTS AS DISEASE CURING AGENTS

Medicinal plants, herbs, spices and herbal remedies are known to Ayurveda in India since long times. The value of medicinal plants, herbs and spices as herbal remedies is being lost due to lack of awareness, and deforestation.

The result is many valuable medicinal herbs are becoming rare and precious information is lost. Less pollution we make, more ecological balance we maintain, will add to happiness of humankind.

Preserve the knowledge of medicinal plants, herbs, spices and herbal remedies, which humankind has received from the past generations, for posterity. History of herbal remedies is
very old. Since old times before modern medicine, people became ill and suffered from various ailments.

In absent of modern medicinal remedies people relied on herbal remedies derived from herbs and spices. There are many medicinal herbs and spices, which find place in day-to-day uses, many of these, are used as herbal remedies. Many cooked foods contain spices. Some minor ailments like common cold, cough, etc. may be cured by herbal remedies with use of medicinal properties of spices.

Herbal remedies can be taken in many forms. Infusions are steeping herbs or spices, with parts like leaves and flowers with boiling water for some time. Filtered or unfiltered use this water extracts of spices as herbal remedies.

Decoction is boiling roots, bark and hard parts of herbs and spices with water for along time. Infusion and decoction both are known as herbal teas. Some times essential oil of herbs and spices are also used as herbal remedies.

Action of herbal remedies may vary from human to human and care should be observed in using it. Always inform your healthcare professional while taking any of the herbal remedies or consuming large quantity of medicinal herbs or spices as medicinal product.

1.4. ANTIMICROBIAL ACTIVITY OF GREEN PLANTS

Infectious diseases are disorders caused by pathogenic microorganisms like bacteria, viruses, fungi, protozoa and multi cellular parasites. These diseases are also called as contagious or transmissible diseases since they can be transmitted from one person to another via a vector or replicating agent. Infectious diseases account for about half of the deaths in tropical countries.

Bacterial diseases are a type of infectious diseases caused by pathogenic bacteria. It is noteworthy that majority of bacteria are non pathogenic and are not injurious to human health. Some bacteria are even helpful and necessary for the good health.

Millions of bacteria normally live in the intestine, on the skin and the genitalia. Bacterial diseases results when the harmful bacteria get into a body area, multiply their and beat the body’s defensive mechanism.

Pathogenic bacteria can attack in the body through various routes like inhalation into nose and lungs, ingestion in food or through sexual contact. Once bacteria enter the body, the immune
system of the body recognizes the bacteria as foreign intruder and tries to kill or stop them from multiplying. However, even a healthy immune system is not always able to stop the bacteria from reproducing and spreading. As a result bacteria thrive in the body and emit toxins which damage cells and tissues that consequently results in the symptoms of bacterial disease.

Commonly occurring pathogenic bacteria are *Neisseria meningitidis*, which can cause meningitis, *Streptococcus pneumoniae*, which can cause pneumonia, *Helicobacter pylori*, which can cause gastric ulcers, *Escherichia coli* which can cause food poisoning, *Salmonella typhi*, which can cause typhoid, and *Staphylococcus aureus*, which can cause skin and other infections.

Many efforts have been made to find out new antimicrobial compounds from various kinds of sources such as micro-organisms, animals, and plants. One of such resources is folk medicines. Systematic screening of them may result in the discovery of novel effective compounds (Tomoko et. al., 2002).

The increasing incidence of multidrug resistant strains of bacteria and the recent form of strains with reduced susceptibility to antibiotics raises the apparition of untreatable bacterial infections and adds necessity to the search for new infection-fighting strategies (Sieradski et. al., 1999).

China has accumulated knowledge of the use of medicinal plants for the treatment of various diseases. Chemical studies of Chinese medicinal plants provide a valuable material base for the discovery and development of new drugs of natural origin (Qin et. al., 1998). The antimicrobial synthetic drugs which have derived from plant origin are not associated with many side effects and have an enormous therapeutic potential to heal many infectious diseases (Iwu et. al., 1999).

Medicinal plants have a rich source of antimicrobial agents. Plants are used medicinally in different countries and these are the source of many effective drugs. (Srivastava et. al., 1996). A wide range of medicinal plant parts is used for extract as raw drugs and they possess varied medicinal properties. The different parts used include root, stem, flower, fruit, twigs exudates and modified plant organs. Hundreds of plants species have been tested for antimicrobial properties, the vast majority of have not been adequately evaluated. (Bollinger et. al., 1985)
The enormous potentiality of plants as sources for antimicrobial drugs with reference to antibacterial and antifungal agents, a systematic investigation was undertaken to screen the local flora for antibacterial and antifungal activity from *Acacia nilotica, Sida cordifolia, Tinospora cordifolia, Ziziphus mauritiana* and *Withania somnifera*.

### 1.5. SYMPTOMS, COMPLICATIONS AND RISK FACTORS OF BACTERIAL DISEASES

Universal symptoms of bacterial diseases include fever, chills, headache, nausea and vomiting. Bacterial infections if untreated can lead to serious and life threatening complications such as sepsis, kidney and liver failure, toxic shock and even death. Infectious diseases are a leading cause of mortality worldwide.

### 1.6. IMPORTANCE OF MEDICINAL PLANTS

Medicinal plants have been found useful in the cure of a number of diseases including bacterial diseases. Medicinal plants are a rich source of antimicrobial agents. Due to a rapid increase in the rate of infections, antibiotic resistance in microorganisms and due to side effects of synthetic antibiotics, medicinal plants are gaining popularity over these drugs.

Although medicinal plants produce slow recovery, the therapeutic use of medicinal plant is becoming popular because of their lesser side effects and low resistance in microorganisms. Antimicrobial activities of many plants have been reported by the researchers.

The antimicrobial activities of medicinal plants can be attributed to the secondary metabolites such as alkaloids, flavonoids, tannins, and terpenoids etc. that are present in these plants. 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 fix 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. The small part of 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, digiotoxin, gitoxigenin, digoxigenin, tubocurarine, morphine, codeine, aspirin, atropine, pilocarpine, capsicicine, allicin, curcumin, artemesinin 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, 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 number of the Ayurvedic drugs is in the form of unrefined extracts that are the mixture of the different components and the active principles when isolated them individually fail to give desired activity. It shows that the activity of the unrefined extract is the harmonically 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 the 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 the 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 required to be very 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 these all 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 concern 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 tenth among all the plant rich nations of Asia, sixth as far as centres of diversity especially agro diversity are 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, but none of them is presently produced through synthetic means. For developing phyto medicines as main area of concern, it would be required to adopt a holistic interdisciplinary approach, have a scientific base for the understanding of the plant systems, new innovations and their conservation for utilizing in future on a sustainable basis (Sharma et al., 1997).

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

The growth of microorganisms can be controlled via two methods, physical and chemical agents, being these two ways, are chosen 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. In this view that some plants have the healing potential, indeed that they contained what we would currently classify as antimicrobial principle, as well as accepted. Science 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 and that is why natural products are safer because they are in more synchronization with the biological system (Atal et. al., 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 ant parasitic actions have been recognized (Gessler et. al., 1994; Tahir et. al., 1999; 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 providing maximum safety and secure treatment having minimum side effects. It is of great importance to ensure the safety of its products and practices standardization. Our ancient literature i.e. Vedas made us to learn about the introduction of these medicinal products from plants, with the time and rapid advancement had lead pathogens to achieve resistance against new generation antibiotics. So the introduction for 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; which need right direction in documentation and research work.

1.7. PHYTOCHEMICAL SCREENING OF MEDICINAL PLANTS
Phytochemicals are chemical compounds formed during the plants normal metabolic processes. These chemicals are often referred to as secondary metabolites of which there are several classes including alkaloids, flavonoids, coumarins, glycosides, gums, polysaccharides, phenols, tannins, terpenes and terpenoids (Harborne et. al., 1973; Okwu, et. al., 2004). Phytochemicals are present in a variety of plants utilized as important components of both human and animal diets. These include fruits, seeds, herbs and vegetables (Okwu et. al., 2005).

Diets containing an abundance of fruits and vegetables are protective against a variety of diseases, particularly cardiovascular diseases (Okogun et. al., 1985). Herbs and spices are accessible sources for obtaining natural antioxidants (Okwu et. al., 2004).
In addition to these substances, plants contain other chemical compounds. These can act as agents to prevent undesirable side effects of the main active substances or to assist in the assimilation of the main substances (Anonymous, 2007a).

There are several standard methods used for the Phytochemicals screening of medicinal plants. They are as described for alkaloids (Harborne et al., 1973), steroids (Trease et al., 1989), phenolics and flavonoids (Awe et al., 2001), saponins and cardiac glycosides (Sofowora et al., 1993), tannins (Odebiyi et al., 1978).

Methods for quantitative analysis of Phytochemicals are as described for phenolics (Edeoga et al., 2005), flavonoids (Boham et al., 1974), alkaloid (Harborne, et al., 1973), saponins (Obadoni et al., 2001) and glycosides (El-Olemy et al., 1994).

In contrast to synthetic pharmaceuticals based upon single chemicals, many medicinal and aromatic plants exert their beneficial effects through the additive or synergistic action of several chemical compounds acting at single or multiple target sites associated with a physiological process.

These synergistic pharmacological effects can be beneficial by eliminating the problematic side effects associated with the predominance of a single xeno biotic compound in the body. Kaufman et al., (1999) extensively documented how synergistic interactions underlie the effectiveness of a number of Phyto medicines.

Most of these photochemical constituents are potent bioactive compounds found in medicinal plant parts, which are precursors for the synthesis of useful drugs (Sofowora et al., 1993).

Medicinal plants have always been considered a healthy source of life for all people. Therapeutically properties of medical plants are very useful in healing various diseases and the advantage of these medicinal plants is being 100% natural.

Many efforts have been made to discover new antimicrobial compounds from various species of medicinal plants. Medicinal plants are heavily and worldwide used in folk medicine. Screening of such plants may result in the discovery of novel effective compounds against pathogenic microorganisms.
The compounds that can either inhibit the growth of pathogens or kill them and have no or least toxicity to host cells are considered candidates for developing new antimicrobial drugs. Jordan has a rich flora and a wide knowledge of its indigenous medicinal plants.

Medicinal plants constitute an important component of flora and are widely distributed in different floristic regions of Jordan because of its geographic location, climate, and the presence of nearly 2,500 natural plant species. More than 500 species are classified as medicinal plants which are widely distributed all over the country and used for the treatment of various diseases (Eisawi et al., 1982; Eisawi et al., 1998) (Irmaileh et al., 2000).

In recent years, drug resistance to human pathogenic bacteria and fungi has been commonly reported from all over the world. Therefore, the increasing prevalence of multidrug resistant strains of microorganisms and the recent appearance of strains with reduced susceptibility to antibiotics raises an urgent need to search for new sources of antimicrobial agents (Sieradzki et al., 1999).

Human infections, particularly those involving the skin and mucosal surfaces constitute a serious problem, especially in tropical and subtropical developing countries (Falahati et al., 2005).

Methicillin-resistant *Staphylococcus aurus* (MRSA), *Staphylococcus aurus*, *Escherichia coli*, *Pseudomonas aerogenous*, and *Candida albicans* were observed to be the most frequent skin pathogens. MRSA gained much attention in the past decade, as it is a major cause of hospital-acquired infections.

The use of plants as source of remedies for the treatment of many diseases dated back to prehistory and people of all continents have this old tradition. Despite the remarkable progress in synthetic organic chemistry of the twentieth century, over 25% of prescribed medicines in industrialized countries derived directly or indirectly from plants (Newman et al., 2000).

However, plants used in traditional medicine are still understudied, particularly in clinical microbiology (Kirby, 1996). It is reported that most antibiotics derived from microorganisms,
and one to three antibiotics are launched every year (Clark, 1996). In developing countries where medicines are quite expensive, investigation on antimicrobial activities from ethno medicinal plants may still be needed.

It is obvious that these Phytochemicals will find their way in the arsenal of antimicrobial drugs prescribed by physicians (Cowan et. al., 1999). Any antibiotic has a limited effective life and the public is becoming increasingly aware of problems with the over prescription of these antibiotics.

In addition, many people, principally in the developed countries are interested in having more autonomy over their medical care, so self-medication is commonplace (Eisenberg et al., 1993). Medicinal plants are plants whose extracts can be used directly or indirectly for the treatment of different ailments. Therefore, the use of traditional medicine and medicinal plants in most developing countries, as a basis for the maintenance of good health, has been widely observed (Edward et. al., 2001). Scientists throughout the world are trying to explore the precious assets of medicinal plants to help the suffering humanity. Furthermore, in the world more than 30% of the pharmaceutical preparations are based on plants (Khan et. al., 1998).

However, an increasing reliance on the use of medicinal plants in the industrialized societies has been traced to the extraction and development of several drugs and chemotherapeutics from these plants. The use of medicines from plants in the form of local medicine dates back to 4000-5000 B.C. While the medicinal values of these plants are due to the presence of small doses of active compounds which produces physiological actions in the human and animal body (Zaidi et. al., 1998). Some of the important bioactive compounds found in medicinal plants are alkaloids, glycosides, resins, gums, mucilage’s etc. (Sack and Froehlich et. al., 1982). It was observed that developed countries mostly imports raw materials of valuable medicinal plants from developing countries. Where they are screened, analyzed and used in drug preparations, and returned as high priced medicines to developing countries (Shinawie et. al., 2002).
In Pakistan there are about 2000 estimated species of medicinal plants out of which 400 are extensively used in traditional medicine. Pakistan has variety in climate and therefore rich in medicinal plants, but no systematic attempt has been made to work and utilize natural resources of this country.

1.8. BIOACTIVE COMPOUNDS

Isolation and identification of bioactive compounds can be rapid by the use of high tech instruments such as high performance liquid chromatography [HPLC system] which is suitable for analysis, identification, quantification, photo documentation, and micro preparative chromatography.

As the system incorporates TLC which is fully automatic and computer controlled it is possible for quantitative measurement and spectrum scanning for quick identification/purity check of plant medicines.

The bioactive compounds present in plants can be classified into flavonoids, quinines, terpenoids, and alkaloids. A disease may be cured by any one of these or by all. Conversely a compound may cure a disease or a group of diseases.

The extraction, purification, and identification of these compounds and establishing their therapeutic values constitute a branch called phyto pharmaceuticals. A successful marketing of therapeutically effective compound involves several years of research and millions of dollars.

Most of the plant medicines are effective only when they are taken fresh from plants, since they lose their efficacy when they are extracted and purified from plants. This is due to several factors.

The parental compound may require additional compounds to enhance its activity that were lost because of extraction procedures or the actual compound would have been modified during extraction.

Totally unrelated plants synthesize the same group of compounds irrespective of their location. For example, kaempferol, a flavones, and anthraquinones, possessing several therapeutic properties like antiviral, antibacterial, antifungal, and anti-inflammatory are present in more than thousand numbers of plants.
1.9. PLANTS AS ANTIOXIDANT AGENTS

Oxidative stress is a problem in human body being since it not only makes our body cell age but causes disease such as cancer that are difficult to treat. By stop the ageing process we can get the healthy body. This can be done using certain chemicals and metals to prevent oxidant or mop up free radicals from the body is known as oxidant (the human body produce the endogenous antioxidants such as reduced gluthione (GSH) superoxide dismutase(SOD),Catalyse and glutathione peroxide(GPX) which are very important for counteracting or preventing oxidative stress (Sen,1995),but the amount produced by the human body is insufficient. therefore supplementation had to be adopted in order to get enough antioxidants using natural exogenous anti oxidants, such as vitamin C,vitamin E,flavone,beta-cartone,natural products implants and so on (Diplok et. al., 1998; Evans et. al., 1997) exogenous, antioxidants(Grice et. al., 1986;Sokmen et.al.2004) and they are useful agent for prevention of cardio vascular disease (Brown et. al., 1994) and several kind of cancers.

*Catharanthus roseus* (L.) G. Don is the member of family Apocynaceae and it is known worldwide for its enormous pharmaceutical properties because it contains >120 terpenoids indole alkaloids (TIAs), some of which exhibit strong pharmacological activities. (Verpoorte R et. al., 2004).The plant is known to control major diseases such as leukaemia and diabetes (Chattopadhyay et. al., 1992; Singh et. al., 2001; Sayed et. al., 2005).

Recently, there has been an increased interest in oxygen containing free-radicals in biological systems and their implied roles as causative agents in the etiology of a variety of chronic and ageing diseases, including AIDS (Leinonen et. al., 1999; Olukemi et. al., 2005).cancer (,Verpoorte et. al.,1998). And age-related neuronal degeneration (Kandaswami et. al., 1986).

Hence, therapy using free radical scavengers (antioxidants) has potential to prevent, delay or ameliorate many of these disorders (Delanty et. al., 2000). Numerous natural antioxidants have already been isolated from different varieties of plant material such as leafy vegetables, fruits, seeds, cereals and algae (Pokorny et. al., 1991). They have been shown to have
reactive oxygen species scavenging (ROS) and lipid per oxidation preventive effects (Atawodi et. al., 2005). (Mahmud et. al., 2006). The protection can be explained by the capacity of the antioxidants phenolics, flavonoids and polypropanoids in the plants and plant products to scavenge free radicals, due its proton donating ability. The antioxidant content of plant might be influenced by genotype x environment (G x E) interactions.

1.10. ANTI TUMOR POTENTIAL OF ARID ZONE PLANTS

The inhibition of agro bacterium tumefaction’s induced tumours or crown gall in potato disc tissue is an assay based on anti mitotic activity and can detect a broad range of known and novel antitumor effects (Rogeras et. al., 1998) Crown Gall is a neo plastic plant disease caused by A.tumeficians (Kahl et. al., 1982; Lippincott et. al., 1975).

The validity of this bioassay is predicted on the observation that certain tumorigenic mechanisms are similar in plants and animals. it has been shown that the inhibition of crown gall tumour initiation on potato discs and subsequent growth showed good correlation with compounds and extracts in the 3PS leukemic mouse assay. Podophyllin, taxol, camptothecin, vincristine and vinblastin have all shown significant tumour inhibition potentials. Attempts will be made in the present research to isolate such active compounds with the potentials to anti neoplastic agents.

1.11. ARID ZONE PLANTS

Arid Zone Trees began its research on cloning desert trees with two principles in mind. First, of them there are many individual trees in the desert areas that may exhibit desirable characteristics for landscape applications. And second, that all trees developed and need to possess both desirable physical and horticultural characteristics. To satisfy both goals we embraced a multiple clone approach.

By identifying a number of trees from within Single specie with desirable characteristics, we can offer uniformity while maintaining some genetic diversity. The search for new trees to clone
continues and offers the opportunity to introduce new clones when suitable selections are identified.

Three arid zones can be classified by three types.

1. hyper-arid.

2. Arid.


Of the total land area of the world, the hyper-arid zone covers 4.2 percent, the arid zone 14.6 percent, and the semiarid zone 12.2 percent. Therefore, almost one-third of the total area of the world is arid land.

1.11.1. hyper-arid zone plants

Hyper arid zone (arid index 0.03) comprises dry land areas without vegetation, with the exception of a few scattered shrubs. True nomadic pastoralism is frequently practiced. Annual rainfall is low, rarely exceeding 100 millimeters. The rains are infrequent and irregular, sometimes with no rain during long periods of several years.

1.11.2. Arid zone plants

Arid zone (arid index 0.03-0.20) is characterized by pastoralism and no farming except with irrigation. For the most part, the native vegetation is sparse, being comprised of annual and perennial grasses and other herbaceous vegetation, and shrubs and small trees. There is high rainfall variability, with annual amounts ranging between 100 and 300 millimeters.

1.11.3. Semi-Arid Zone Plants
Semi arid zone (arid index 0.20-0.50) can support rain-fed agriculture with more or less sustained levels of production. Sedentary livestock production also occurs. Native vegetation is represented by a variety of species, such as grasses and grass-like plants, fortes and half-shrubs, and shrubs and trees. Annual precipitation varies from 300-600 to 700-800 millimeters, with summer rains, and from 200-250 to 450-500 millimeters with winter rains.

Arid conditions also are found in the sub-humid zone (arid index 0.50-0.75). The term "arid zone" is used to collectively represent the hyper-arid, arid, semi-arid, and sub-humid zones.

1.12. Introduction of *Wrightia tinctoria* (Roxb.) R.Br

112.1.1. Scientific classification

Kingdom: Plantae
(Unranked): Angiosperms
(Unranked): Eudicots
(Unranked): Asterids
Order: Gentianales
Family: Apocynaceae
Genus: *Wrightia* Species
1.13. Description of *Wrightia tinctoria* (Roxb.) R.Br

*Wrightia tinctoria* (Roxb.) R.Br is the member of Apocynaceae (dogbane) family. It is flowering plant having 23 species in the genus. It is native to tropical Africa, Asia and Australia. The species of *Wrightia tinctoria* (Roxb.) R.Br is small trees or shrubs. The genus name wright was given on the name of William Wright (1735 –1819) the Scottish physician by botanist Robert Brown. It is also called Sweet Indrajao. It is a small, deciduous tree with a light gray, scaly smooth bark. The plant have white color flower. The fruits pendulous, long paired follicles joined at their tips. The hairy seeds are released as the fruit dehisces. The leaves of this tree give up a blue dye called Pala Indigo. Because of its preservative nature it is also called the dhudi . If few drops of its sap are added in milk it will prevent curdling and enhance its shelf life, without the need to refrigerate. Its barks, leaves, roots and seeds are useful in medicine purpose.
1.14. Medicinal uses of *Wrightia Tinctoria* (Roxb.) R.Br plant

*Wrightia tinctoria* (Roxb.) R.Br plant is very valuable in different types of disease. It is used in the fever, intestinal Worms, dysentery etc. The leaves of *wrightia tinctoria* (Roxb.) R.Br also used in mumps and herpes as a poultice. The leaves are also used to relieve toothache.

It is also used for women for improving fertility. For improving fertility the root powder of *Wrightia tinctoria* (Roxb.) R.Br along with *Phyllanthus amarus* (keezhanelli) and *Vitex negundo* (nochi) is mixed with milk orally given to women. The bark and seed of *Wrightia tinctoria* (Roxb.) R.Br is used in psoriasis and non-specific dermatitis. It is also used in hair oil preparations. It has presence of anti-inflammatory and anti-dandruff properties. The plant is very functional as stomachic, anti dysenteric, carminative, astringent, aphrodisiac and diuretic, used in the treatment of abdominal pain, skin diseases and bilious affections. The plant also has the Fungicidal, anti nociceptive, wound healing, immune modulatory and antiulcer activity.

The major chemical compounds in the plant are triacontanol, tryptanthrin, β-amyrin, ursolic acid, oleanolic acid, β-sitosterol, cycloartenone, cycloeucalenol, β-sitosterol, lupeol, wrightial; 14α-methylzymosterol desmosterol and clerosterol. Many poly herbal formulation have been made for curing psoriasis, diarrhoea and dysentery, dandruff and for rejuvenation of joint function. The present study was undertaken to examine the consequence of sub-acute administration of *Wrightia tinctoria* (Roxb.) R.Br barks extract on some haematological, biochemical, histological and antioxidant enzyme status of rat liver and kidney following 21 and 45 days treatment. The animals were observed for gross physiological and behavioural responses, food and water intake and body weight changes. Free radical scavenging activity and histopathology was done on liver and kidney samples.

*Wrightia tinctoria* (Roxb.) R.Br showed significant hemopoiesis with increase in body weight signifying anabolic effect. It significantly reduced serum SGOT level and increased glucose levels. *Wrightia tinctoria* (Roxb.) R.Br caused increased SOD activity of liver along with Catalase of both liver and kidney and decreased liver peroxidise (P <0.001). These features indicate that *Wrightia tinctoria* (Roxb.) R.Br up to 1000 mg/kg daily dose is safe and has potential to be consumed for long time in management of various diseases.
1.17. Introduction of *Dyerophytum*.

1.17.1.1. Scientific classification

Kingdom    -   Plantae
Phylum      -   Tracheophyta
Class          -   Magnoliopsida
Order         -   Plumbaginales
Family       -   Plumbaginaceae
Genus        -   *Dyerophytum*

**photograph 3. *Dyerophytum* plant**

1.18. Morphology of *Dyerophytum*


*Dyerophytum* Plant is a under shrubs plant, it is 1 – 2m high, with terete branches. The Leaves of *Dyerophytum* Plant is 3.5 – 8.0x2.0 – 5.5 cm and it is found in different shapes. Ovate or ovate – elliptic to sub orbicular, obtuse or apiculate, undulate, coriaceous, more or less covered with scurfy scales. The Flowers of *Dyerophytum* Plant is golden – yellow, in 2 – 10 cm long,
bracteates, branched spikes. Calyx – teeth about half the length of tube, acute. Corolla of *Dyerophytum* Plant is – lobes obovate – oblong, emarginated. Capsules 5 – 8 mm long, glabrous, 5 – valves. Seeds of *Dyerophytum* Plant is pyriform, smooth, and brown.

**Fl. & Fr.:** October – January.

*Dyerophytum* Plant is Common found in wastelands and open forests, predominantly on dry rocky hill – slopes.

**Selected specimens:** Ajmer: Mova Bir, Duthie 6661 (DD); Barmer: Haldeshwar, Tiwari 1178 (BSJO); Jaipur: Ramgarh, Sharma 1810 (RUBL); Sirohi: Mt. Abu, Raizada 20771 (DD); Udaipur: perkar 3383 (DD).

**Fig.4.** Transverse section of *Dyerophytum*. Stem

**Characteristics of the xylem:**
Radial multiples are characteristic of *Dyerophytum* vessel diameter is < 20 micrometer is all species. Vessels of most species are thick walled except in *Dyerophytum*. The radial walls of fibres are perforated by very small alit like or round pits in all species septate fibres occur only in *Dyerophytum* fibres are either thin or thick walled successive cambia occur in *Dyerophytum* Septate fibres with un lignified horizontal cell walls. Stem of 1.5 meter high shrum on rock, subtropical climate.
1.19. PROBLEM STATEMENT

Rajasthan state is known by different regions with different biodiversities. For example - Abu region, Swai madhopur, Udaipur, Banswara region & Jaisalmer, Bikaner region. These all regions show different biodiversities, due to which 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.

The significant contribution to the society, traditional medicine has experience very little, attention in modern research and development and less effort has been done to upgrade the practice, today the continued deforestation and environment degradation of habitats in many part of country has brought associate knowledge. The part of medicinal plants collected also poses a serious threat to the survival of the species loss of knowledge has been aggravate by the expansion of modern education which has made the younger generation underestimate its traditional values.

Today many indigenous herbal remedies, remain largely undocumented or recognize as potential form of treatment and consequently continue to be used by only small group of indigenous population. Hence there is an urgent need to isolate such bioactive from arid zone plants and Indian medicinal plants to aid certain cures for various diseases. In this research problem certain plants will be extracted and their proteins will be further screened for therapeutic potential to cure the ailments.