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Plants are the basis of sophisticated traditional medicine system that has been in existence for thousands of years. They provide a good source of starting material for the discovery of biologically active molecules that could be developed into new drugs. The plant chemicals involved in these purposes are largely the secondary metabolites which are derived biosynthetically from plant primary metabolites and are not directly involved in the growth, development and reproduction of plants. Natural products from plant source seem to be a promising alternative in the management of plant and human diseases. Plant’s derived compounds are always a source of novel therapeutics. Only a small portion of available diversity has been explored and still a large percentage of plants with potent biomolecules are present in the world.

History of herbal medicine

Throughout the ages, humans have relied on nature for their basic needs for the production of food stuffs, shelters, clothing, flavours and fragrances and importantly, medicines. Fossil records date human use of plants as medicines at least to the Middle Paleolithic age some 60 thousand years ago (Fabricant and Fransworth, 2001). The first records written on clay tablets in cuneiform; are from Mesopotamia and date from about 2600 BC, among the substances used were oils of Cedrus species, Cupressus sempervirens, Glycyrrhiza glabra and Papaver somniferum all of which are still in use today for the treatment of ailment ranging from cough and cold to parasitic infections. The Egyptian Pharmaceutical record Ebers Papyrus which dates from 1500 BC documents some 700 drugs including formulas such as gargles, snuffs, infusions, pills, milk, wine and honey being commonly used. In the ancient western world, the Greeks contributed to the use of herbal drugs. Naturalist Theophrastus (300 BC) in his history of plants dealt with the medical qualities of herbs. Chinese Materia Medica has been extensively documented over the centuries with the first record dating from about 1100 BC (Wu Shi Er Bing Fang containing 52 prescriptions), followed by Shennong herbal (365 drugs) and Tang herbal (850 drugs). Likewise, Indian Ayurvedic system dates from 1000 BC (Susruta and Charaka) giving description of over 700 herbs (Cragg and Newman, 2002). Ayurveda, Unani, Kampo and traditional Chinese medicine have flourished as systems of medicines in use for thousands of
years and they are still in practice because of their strengths and focus on multi component mixtures (Fabricant and Fransworth, 2001).

**Therapeutic agents from ethno- medicine**

Ethno- medicine may be defined broadly as the use of plants by humans as medicines. Ethno- pharmacology is a highly diversified approach to drug discovery involving the observation, description and experimental investigation and their biological activity (Fransworth, 1994). Several types of ethno medical information are available in the Ayurveda, Unani, Kampo and Chinese traditional literature. According to another definition “Ethno- pharmacology is a multi disciplinary study of biologically active agents used in traditional medicine”.

Ethnopharmacology investigations classically involved traditional healers, botanists, anthropologists, chemists and pharmacologists. According to the World Health Organization (WHO) a large segment of human population still depends on traditional medicine or so called alternative medicine as the preferred form of healthcare, even with improved access to modern medicine. A noteworthy feature in many ethno medical systems is the use of food plants as ingredients for drug preparation. The non-nutritional exogenous biochemicals (alkaloids, flavonoids and terpenoids) have therapeutic potentials. Most of the secondary plant compounds employed in modern medicine were first discovered through ethnobotanical investigation (Gureb-Fakim, 2006). Naturally occurring compounds and their derivatives constitute about half of all drugs in current use. They have also provided the molecular template or intellectual stimulus for the synthesis of about half of all synthetically produced medicinal compounds. A statistical analysis of compounds isolated from natural products by total synthesis employed in drug development has shown that a mere 90,000 known naturally occurring compounds contributed about 40% of the total possible drugs, whereas several millions of synthetic molecules accounted for the remaining 60% (Iwu, 2002). About 70- 80% of the world populations particularly in developing countries rely on traditional medicine in their primary healthcare as reported by the WHO and considers phytotherapy in its health programme and suggests basic procedures for the validation of drugs from plant origin in developing countries (Pandey et al., 2011). The world market for herbal medicine, including herbal products and raw materials has been estimated to have an annual growth rate between 5 and 15%. Worldwide market of herbal medicines is
estimated to be around US $90 billion by 2020. In India, the value of botanicals related trade is about US $10 billion per annum with annual export of US $1.1 billion (Meena et al., 2009). Presently, the United States is the largest market for Indian botanical products accounting for about 50% of the total exports.

**Relationship between Ayurveda and modern medicine**

Ayurveda, one of the major traditional forms of medical practice in India has produced many useful leads in developing medications. Long ago Hippocrates proclaimed “Let food be thy medicine and medicine be thy food” (Cragg and Newman, 2002). A golden triangle consisting Ayurveda, modern medicine and modern science (Modern technology) will converge to form a real discovery engine that can result newer, safer, cheaper and effective therapies (Mashelkar, 2003). The golden triangle approach proposed in the Chitrakoot declaration is shown in **Fig. 1.** Ayurvedic knowledge and experimental database can provide new functional leads to reduce time, money and toxicity, the three main hurdles in drug development. These records are valuable since the medicines have been effectively tested for thousands of years on people in India (Patwardhan and Hooper, 1992).

![Fig. 1: Golden Triangle](image)

**Herbal medicine in India**

India is regarded as one of the 12 mega biodiversity centers of the world. It has a vast area with wide variation in climate, soil, altitude and latitude. The country has a rich floral diversity of about 45,000 plant species with 15,000-18,000 flowering plants and medicinal properties have been assigned to several thousands. The diversity is unmatched due to the 16 different agroclimatic zones, 10 vegetative zones
and 15 biotic provinces (Patwardhan et al., 2004). In India, Ayurveda contributes Rs. 3500 crores (US$ 813 million) annually to the internal market of phytomedicines. The Indian medicinal plant based industry is growing at the rate of 7-15% annually (Joshi et al., 2004). Research regarding herbal medicines is in progress at CDRI (Central Drug Research Institute), CIMAP (Central Institute of Medicinal and Aromatic Plants), FRHLT (Foundation for Revitalization of Local Health Traditions), Arya Vaidya Shala, NBRI (National Botanical Research Institute), CSIR (Council for Scientific and Industrial Research) and Universities/Institutions including University of Mysore, which aims at systematic chemical and pharmacological investigations of Indian medicinal plants and plant based traditional remedies for isolation of active constituents, chemical modifications of natural products to obtain new therapeutic agents and for the development of novel drugs (Vaidya and Devasagayam, 2007).

Indian forest flora is rich in medicinal plants. Phytochemical studies of a number of medicinal plants have been carried out and active principles are isolated and characterized, which are being used as drugs. NAPRALERT (Natural Products Alert) contains bibliographic and factual data on natural products, including information on the pharmacology, biological activity and chemistry of plants had 1,87,821 bibliographic records containing information for over 155,000 natural products as on July 2013 in the NAPRALERT database. The herbal extracts are natural products with low mammalian toxicity, low persistence in the environment and easily biodegradable. The microorganisms find it difficult to develop resistance due to its complex structure. They are associated with least side effects on long term use. There are fewer hazards to non-target organism. No adverse effect on plant growth, seed viability or food quality has been reported. They are less expensive and easily available naturally in abundance (Opara and Wokacha, 2008).

The path of reverse pharmacology arising from observational therapeutics is complementary to other approaches for natural drug development. Plant derived and other natural products (secondary metabolites) have provided many novel prototype bioactive molecules some of which have led to important drugs that are available in the market today (Vaidya and Devasagayam, 2007). Other than the direct usage of plant secondary metabolites in their original forms as drugs, these compounds can also be used as drug precursors, drug prototype and pharmacological probes (Salim et al., 2008).
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One of the successful strategies for investigation of medicinal agents from higher plants includes the pharmacological screening of plant extracts, followed by bioassay of active fractions of the plants, leading to the isolation of the pure constituents. Phytochemical studies of a number of plants have been carried out and active principles are isolated and characterized, which are being used as drugs. But still there is a vast wealth of medicinal plants that have not been explored and exploited which contains active constituents with potency to be exploited for human welfare. Therefore, phytochemical studies need to be done on the unexplored medicinal plants to study their potential for various biological activities, isolation and characterization of the active compounds present. Thus, phytochemicals with previously unknown pharmacological activities have to be extensively investigated as a source of multipurpose therapeutic agents and scientific validation of traditional knowledge can be achieved by biological assay.

Crop loss and its management

Agriculture sector has long been an epitome of Indian culture, prosperity and played a vital role for the food and nutritional security of the nation. Agricultural land of the world is estimated to be 37.6% and in India it is 55.5%. Of these, the general production of food grains in India is reported to be around 250-260 million tonnes/annum (State of Indian Agriculture, 2012-13). But Indian agricultural sector faces a big challenge of crop failures directly or indirectly related to plant diseases caused by viruses, bacteria, fungi and nematodes. Approximately 70,000 pest species comprising of 10,000 species of insects and mites, 50,000 species of plant pathogens and 10,000 species of weeds are destroying agricultural crops and livestock (Agrios, 2005). The green revolution changed the 10,000 year old evolutionary history of crops by changing the agricultural production; as a result lot of undesirable effects occurred including land degradation and genetic erosions, which resulted in explosive growth of pests and diseases in the crops (Kumar and Rawat, 2011). As per the estimates of Central Pollution Control Board, the food grain loss in India due to weeds (28%), diseases (25%), insects (23%), during storage (10%), rattan’s (8%) and others (6%). Nearly 30% of agriculture products worth of Rs. 2.5 lakh crores per annum is lost in India (Walia and Dikshit, 2009).

Despite the annual investment of US $35 billion for the application of 3.0 million metric tons of pesticides and other chemical and non-chemical controls
worldwide, more than 40% of the world crops valued at US $ 7.5 billion are destroyed by pest. The magnitude of crop loss in India estimated to be due to insect pests was 25% in rice and maize, 5% in wheat, 15% in pulses and coarse cereals and 50% in cotton (Dhaliwal et al., 2010). Human and animal food such as cereals, millets and oil seeds are also susceptible to mould damage and mycotoxins contamination during growth, harvest, transport and storage. These mycotoxins are known for their carcinogenicity, hepatotoxicity, reproductive disorders and immune suppressing ability (Rocha et al., 2005). The main use of pesticides in India is in agriculture and public health. In addition pesticides are used to control malaria, filariasis, dengue, Japanese encephalitis, cholera etc. Amount of consumption of pesticides in India is 50,000 tonnes/ year (State of Indian Agriculture, 2012-13). The market for agricultural pesticides was 30 billion US $ in 1995 and has reached 40 billion US $ in 2008 showing an increase in the last 10 years (PAN AP, 2010).

**Pesticides- prospects and consequences**

The rampant use of chemicals played havoc to human and environment. WHO has estimated that use of pesticides cause 3 million poisonings and 220 thousand deaths and about 750 thousand chronic illness every year worldwide (WHO, 2009). Due to the hazardous effects several pesticides are banned/ restricted for use in India. Less than one per cent of pesticides applied to the agriculture reach their target pests and more than 99% of it adversely affects unintended targets including the public environmental health (Pimentel and Burgess, 2012). Blood samples were analyzed by scientists in NIOH (National Institute of Occupational Health) Ahmadabad, indicated that HCH and DDT were the chief contaminants (Bhatnagar et al., 1992). A study conducted by Devanathan and others (2009) on the persistent organo chlorines (OC) in human breast milk from major metropolitan cities in India and reported that all the samples had detectable levels of OC’s implying that the populations of these cities were highly exposed to these contaminants. Perusal of the residue data of pesticides in samples of fruits, vegetables, cereals, pulses, grains, fish, poultry and milk in India indicates their presence in sizable amounts. A report by Bhante and Taneja (2007) showed presence of moderate contamination of vegetables in northern India with organo phosphorous which may be fatal in long run. Organo chlorine pesticide residues in wheat from Turkey were studied by Guler et al. (2010) and found samples were contaminated with residues exceeding Maximum Residual Limit’s and control
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of this pesticide in wheat was very necessary. Pesticides are found in detectable levels in the environment. Toxic effects of pesticides were observed on fresh water sediments and microbial communities even at concentrations predicted to be safe (Widenfalk et al., 2008). Pesticides may directly or indirectly affect the vital biochemical reactions such as mineralization of organic matter, nitrogen fixation, nitrification, de-nitrification and ammonification by activating/deactivating specific soil microorganisms (Kinney et al., 2005; Menon et al., 2005). Inconsistent and excess application of the pesticides may lead to development of resistance in the pathogens. Thiobendazole, a most commonly used post-harvest fungicide on apples and pears in the US Pacific Northwest could not control the growth of blue mold Penicillium expansum which indicated that resistance was developed by P. expansum (Li and Xiao, 2008). Botrytis cinerea a high risk pathogen was found to have developed resistance to aniline, pyrimidine and fungicide which has been detected on numerous crops with resistance frequency as high as 49% (Myresiotis et al., 2007).

The data on environmental cum health risk assessment studies with regard to pesticide are made in the society to think for a better alternate. They have contaminated almost every part of our environment and poses significant risks to non-target organisms and human beings. In the highly interrelated, inter dependent world of modern technology the challenge of protecting crops and livestock’s from insects, diseases, weeds and other pests without hazards to humans, animals and environment requires an integrated approach consisting natural products from plants to manage them.

Biological substitutes for pesticides

With the main concern towards environment and resistant pests, scientists are in search for biologically active third generation pesticides. Twenty years of indiscriminate use of pesticides has documented widespread environment contamination, toxicity and negative effects on human health led to resurgence in interest in natural means of pest control including intensified searches for a new source of botanical pesticides (Isman, 2008). In this pretext, chemicals ought to be integrated intelligently in the Integrated Pest Management (IPM) schedule along with the eco-friendly botanicals and bio-pesticides. Plant derived molecules generally called “botanicals” are now emerging as an acceptable component of IPM strategies. The efficacy of botanicals on various pests and pathogens, safety to predators and
parasitoids and environment friendly nature are highlights of them. The preparation of extracts of various parts of plants, development of suitable formulations and testing for their pesticidal potency is being encouraged throughout the world (Kumbhar et al., 2001).

**Infectious diseases and its impact on human health**

Infectious diseases have affected humans since the first recorded history of man. Infectious diseases remain the second leading cause of death worldwide despite the recent rapid developments and advancements in modern medicine, science and biotechnology. Greater than 15 million (25%) of an estimated 57 million deaths that occur throughout the world annually are directly caused by infectious diseases (Fauci et al., 2005). The vast majority of the bacteria in the body are rendered harmless by the protective effects of the immune system and few are beneficial. But there are several bacteria which are pathogenic causing infectious diseases that undergo antigenic changes to escape our immune system and restrict antimicrobial treatment may sometimes become opportunistic pathogens as it is found in HIV (Shaban and Siam, 2009).

One of the great achievements of medical science, occurring in this century was the discovery of therapeutically effective antibacterial drugs. Nearly all bacterial infectious diseases that were prior to the antibiotic era which were major causes of human deaths have been brought under control by use of these drugs. The great modern advances in chemotherapy come from the discovery of antibiotics. Antibiotic consumption worldwide lies between 1,00,000 and 2,00,000 tonnes. The first chemotherapeutically effective antibiotic was discovered in 1929 by Alexander Fleming, since 1945, thousands of different antibiotics produced by fungi, actinomycetes or unicellular bacteria have been isolated and characterized (Monre and Polk, 2000). Since 2000, twenty new antibiotics have been launched worldwide of which eleven are derived from natural products and nine are synthetically obtained (Butler and Cooper, 2011).

**Effects of antibiotic use and bacterial resistance**

Antibiotic was developed originally to treat human infectious diseases but their use also covered veterinary, agriculture and aquaculture. The broad use of it has created a strong selective pressure resulting in development of resistance. The key
factors responsible for the rise in drug resistant pathogens have been the excessive or inappropriate use of antimicrobial therapy and sometimes indiscriminate use of broad spectrum antibiotics. Frequent and excess use of antibiotics lead to several simple to severe side effects in human beings by different class of antibiotics like amino glycosides- hearing losses, vertigo and kidney damage, cephalosporin- nausea, vomiting and diarrhoea, jaundice, gastrointestinal upset and diarrhoea, allergy with serious anaphylactic reactions, brain and kidney damage, sulfonamide- nausea, vomiting and diarrhoea, allergy (including skin rashes), crystal in urine, kidney failure, decrease in white blood cell count, sensitivity to sunlight (Presscott et al., 2008).

The list of bacteria developing resistance is increasing day by day started from sulfonamide and penicillin resistant S. aureus in 1940’s to penicillin resistant Neisseria gonorrhoeae and β-lactamase producing Haemophilus influenza in 1970’s, multidrug resistant Mycobacterium tuberculosis in 1980’s and several resistant strains of common enteric and non-enteric gram negative bacteria (Alanis et al., 2005). Several antibiotics used in agriculture known to favor emergence of resistance by broadly eliminating competing susceptible flora. Bacteria such as Erwenia amylovora, P. cichorii, P. syringae and X. campestris have attained resistance to streptomycin (Mac Manus and Stockwell, 2002). Resistance of plant pathogenic bacteria to streptomycin resulted in limiting the use of streptomycin primarily for control of fire blight and optimizing the timing and reduces the number of antibiotic spray (Stockwell and Duffy, 2012).

Although it is too late to solve the resistance problem, the drug resistance will continue to worsen if alternate measures are not followed. An essential measure to minimize the increasing rate of resistance in the long run is to have continuous in depth investigation for new safe and effective antimicrobials from natural resources. This emphasized the use of plant as potent candidates for this task to natural products that prevailed in the years before antimicrobial chemotherapy.

**Free radicals in living system**

Oxygen is vital for most living organisms but it is also a source of endogenic oxidants. Various reactive species which are either radicals or non radicals capable of producing radical species are formed during normal metabolic processes (Antal, 2010). Though the free radicals are fundamental to many biochemical processes and
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represent an essential part of aerobic life and metabolism, they are unstable, violently reactive, potentially destructive and short lived. A free radical is an unpaired electron in an outer orbit. It is harmful because in search for a pairing electron, the free radical takes one electron from a stable molecule and in turn resulting chain reaction can injure tissues and impair their function and have been implicated in over hundreds of diseases such as arthritis, cancer, ageing, cardio vascular and neurodegenerative diseases (Sivanandham, 2011). There are two important sources of reactive species generated in the biological system. One is the internal factors which are normal cellular metabolism like mitochondrial electron transport, endoplasmic reticulum oxidation, enzymatic activity, prostaglandin synthesis and stimulated neutrophils, secondly external factors include environmental sources like radiations such as X-rays and gamma rays, visible light or UV in the presence of oxygen, endogenous compounds or drugs that act as photo sensitizer, oxidant of engine exhaust, carbon tetrachloride, paracetamol, pesticides, transition metals, alcohols, pollutants, cigarette smoke etc. (Bandyopadhyay *et al.*, 1999; Tandon *et al.*, 2005). When the body gets exposed to adverse physico-chemical, environmental or pathological agents the delicately maintained balance is shifted in favor of pro-oxidants resulting in ‘oxidative stress’. Though, organisms are able to synthesize proteins, small molecules and specific enzymes protecting the organism from harmful actions of the oxidants, oxidative stress occurs in situations when natural antioxidant defense of the human body is not sufficient to fight excessive generation of reactive species and lead to oxidative damage. The damaged bio-molecules and cells in turn induce a range of diseases (Halliwell, 2001).

**Important pathological and physiological roles of reactive oxygen species**

The role of oxidative stress in the development of different types of diseases is presented in Fig. 2 and 3 (Tandon *et al.*, 2005).
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Fig. 2: Physiological roles of free radicals

Fig. 3: Pathological roles of free radicals
Antioxidants

The word ‘antioxidant’ is increasingly popular in modern society which means, “a substance that opposes oxidation or inhibits reactions promoted by oxygen or peroxide. A more biologically relevant definition of antioxidants is “synthetic or natural substances added to products to prevent or delay their deterioration by the action of oxygen in air” (Huang et al., 2005). The antioxidants are also grouped into two types namely primary or natural antioxidants and secondary or synthetic antioxidants. Natural antioxidants are mainly phenolic structures. Organic vegetables generally have higher contents of phenolics because of less favorable growing conditions. Natural compounds especially derived from dietary sources provide a large number of antioxidants (Pokorny Jan, 2007). Synthetic antioxidants are developed and produced for the benefit of mankind which include butylated hydroxy anisole (BHA), butylated hydroxy toluene (BHT), propyl gallate (PG), metal chelating agent (EDTA), tertiary butyl hydroquinone (TBHQ) and nordihydro guaretic acid (NDGA) (Hurrell, 2003).

But the use of synthetic antioxidants is to be thought twice because WHO’s International agency for research on cancer has evaluated the carcinogenicity of BHA on animal models and suggested possible role of the intake of synthetic antioxidants in cancer. In another study in Netherlands carcinogenicity in human stomach was found when daily intake of BHA and BHT was evaluated on the basis of the frequency of consumption of certain foods (Botterweck et al., 2000). Hence, the use of natural antioxidants mainly from medicinal plants which are rich in phenolic compounds has to be encouraged and validated with scientific experimental investigations.

Helminthic infections

Human beings and livestock are infected with major human soil transmitted helminthus (STH), Ascaris lumbricoides (round worm), Necator americanus, Ancylostoma duodenale (hook worm) and Trichuris trichiura (whip worm) which are the most prevalent parasites worldwide and approximately 1,35,000 deaths occur each year due to STH infections (Awasthi and Bundy, 2007). Helminthic infections such as ascariases, hook worm infection and schistosomiasis constitute the core 13 neglected tropical diseases (NTD’s) affecting world population. Majority of the NTD’s is well pronounced among impoverished populations living in marginalized regions. These diseases continue to cause severe disability and often death. In terms
of disability adjusted life years (DALY’s) (Hotez et al., 2006) estimated the global burden of helminth infections to be 39 million life years which is comparable to tuberculosis (34.7 million DALY’s) and malaria (46.5 million DALY’s), the two major human infectious diseases associated with high rate of mortality. Helminthiasis is also one of the most important animal diseases worldwide, inflicting heavy production loss in grazing animals especially in developing countries leading to mortality, chronic infections causing reduced productivity, fertility growth, milk and meat production in animals (Lone et al., 2013). The clinical symptoms of helminth infection are determined by the infecting helminth species, degree of infection, host age, exposure and entry, adherence and replication, cell and tissue damage, disruption, invasion and inactivation of host defenses. Researchers have also observed a decline in host immune status and increasing the host susceptibility to other pathogens and secondary infections. Helminthes consume nutrients from their host, thereby causing or aggravating malnutrition which result in retarded growth and physical development, iron deficiency, anemia and abdominal pain insomina, vomiting, weakness, stomach pain and migration of ascaris larvae through the respiratory tract can also lead to temporary asthma and other respiratory symptoms. Some of the available anthelmintic drugs are benzimidazoles (albendazole), imidazothiazole (levamisole), macrocyclic lactones (ivermetctin), amino acetonitrile derivatives (AAD), etc. Secondary or side effects of some important anthelmintic drugs include Piperazine- gastrointestinal distress, urticaria, dizziness, ataxia, visual disturbances, Ivermectin- pruritis, fever, tender lymphinodes, thiabendazole- anorexia, nausea, vomiting, vertigo, diarrhea and pruritis. But the frequent and excess use of these drugs has led to the development of resistance in the helminthes. Many reports in the literature have indicated the resistance of helminthes like A. lumbricoides and T. trichiura (Diawara et al., 2009; Piyush Jain, 2013).

However, the emergence of resistance to anthelmintic drugs and the toxicity associated with various side effects; together with increased awareness of consumers about drug residues that potentially enter the food chain has stimulated investigation into alternative approaches to the control of gastrointestinal parasitism.

Keeping in view of the above, the problems associated with the toxicity of pesticides, antibiotic side effects and their resistance, and carcinogenicity and other problems associated with synthetic antioxidants and drugs, a safe and eco-friendly approach from natural source has to be investigated. The plant world which comprises
a rich store house of biomolecules could be tapped as the source for various applications with scientific validation.

**Scope of the work**

The modern agriculture has shown remarkable output, but now combating several issues like toxicity, environmental persistence, biomagnifications and pest resistance. Similarly, infectious disease which was controlled by the use of life saving miracle drugs antibiotics today are posing large threat to human beings leading to increased morbidity and mortality due to emergence of resistance by infection causes microorganisms. The abnormal increase of free radicals have strong tendency to impair the proper functioning of the immune system which can be overcome by the use of antioxidants. Gastrointestinal nematodes are chronic infections that lead to morbidity and mortality, which can be controlled by the use of synthetic anthelmintic drugs. But most of the drugs are associated with several side effects. The use of synthetic antioxidants has to be thought twice due to their carcinogenicity. This has led to a resurgence of interest in natural products especially from plant origin as biopesticides and herbal drugs. Nature has an abundant source of novel chemotypes and pharmacophores. Thus, there is a need for detailed multiple trial investigation for studying the several biological activities of the plant extracts and then subject them for isolation and characterization of the active principles present in it. Hence, the present investigation entitled “Characterization and evaluation of bioactive principles in selected medicinal plants” was undertaken with the following objectives:

- To screen antibacterial potential of the selected plants against plant and human pathogenic bacteria.
- To isolate and characterize the active principle, if any from the plant extract.
- To understand the phytochemistry of the promising plant extract.
- To study the comparative efficacy of the active principle with the currently available antibiotics.
- To evaluate the selected plant extracts for other biological activities such as antioxidant and anthelmintic studies.