The Plant kingdom is the only living entity that sacrifices everything for the benefit of others including the mankind. Plants have been an integral part of human life in all aspects of literature, songs, proverbs and religious thoughts.

“Every moving thing that lives shall be food for you. And as I gave you the green plants, I give you everything”

- Genesis 9:3

"If you want to be happy for a lifetime, plant a garden."

- Chinese proverb

According to a chinese proverb, "Every plant is a medicinal herb". So, the plant kingdom is a treasure house of potential drugs and used for prevention and treatment of ailments. The use of natural products with therapeutic properties is as ancient as human civilization and for a long time, mineral, plant and animal products were the main source of drugs (De Pasqual, 1984). The Chinese book on roots and grasses “Pen T’Sao,” written by Emperor Shen Nung circa 2500 BC, treats 365 drugs (dried parts of medicinal plants), many of which are used even nowadays such as the following: Rhei rhisoma, camphor, Theae folium, Podophyllum, the great yellow gentian, ginseng, jimson weed, cinnamon bark, and ephedra. (Bottcher, 1965; Wiart, 2006). The Indian holy books, Vedas mention treatment with plants, which are abundant in the country. Numerous spice plants used even today originate from India: nutmeg, pepper, clove, etc. (Tucakov, 1971). The Ebers Papyrus, written circa 1550 BC, represents a collection of 800 prescriptions referring to 700 plant species and drugs used for therapy such as pomegranate, castor oil, aloe, senna, garlic, onion, fig, willow, coriander, juniper, common centaury, etc., (Glesinger, 1954).
Indian subcontinent is a vast repository of medicinal plants that are used in traditional medical treatment (Chopra et al., 1956). Out of 17,000 species of higher plants reported to occur within India, 7500 are known to have medicinal uses (Shiva, 1996). The various indigenous systems such as siddha, ayurveda, unani and allopathy use several plant species to treat different ailments (Rabe and Staden, 1997). The World Health Organization (WHO) also estimated that 80% of the population of developing countries rely on traditional medicine mostly plant drugs, for their primary health care needs (Schmincke, 2003). Therapeutic effect of medicinal plants depends upon the quality and quantity of phytochemical constituents. Quality control of the plant raw materials is the most important challenge in bringing any of the traditional medicines or modern phytomedicines to the acceptance of concerned people. Indian medicinal plants have been studied for pharmacological activity in recent years. To understand the mechanism of action, the researchers have worked at molecular levels and several significant phytochemicals have been isolated (Rao et al., 2008).

Phytochemicals are non nutritive plant chemicals that have protective or disease preventive properties. Plants produce these chemicals to protect themselves but recent research demonstrates that many phytochemicals can protect humans against diseases. Plants are considered to be biosynthetic innovatives, which produce primary and secondary metabolites. Secondary metabolites have been shown to alter biological processes which may reduce the risk of chronic diseases in humans. An impressive number of modern drugs have been isolated from natural sources. Many of these isolations were based on the uses of the agents in traditional medicines (Saini et al., 2009). Modern research has made it possible to isolate and identify active constituents from the extracts and to verify their therapeutic activity and specify dose-response relationship. Inspite of developments in synthetic chemistry, higher plants
are still a source of the medicinal compounds. Herbal drug technology is used for converting botanical materials into medicines, where standardization and quality control with proper integration of modern scientific techniques and traditional knowledge are important (Kalpana, 2004).

Plants have been utilized as medicines for thousands of years (Samuelsson, 2004). These medicines initially took the form of crude drugs such as tinctures, teas, poultices, powders, and other herbal formulations (Balick and Cox, 1997; Samuelsson, 2004). The specific plants to be used and the methods of application for particular ailments were passed down through oral history. Eventually information regarding medicinal plants was recorded in herbals. In more recent history, the use of plants as medicines has involved the isolation of active compounds, beginning with the isolation of morphine from opium in the early 19th century (Kinghorn, 2001; Samuelsson, 2004). Drug discovery from medicinal plants led to the isolation of early drugs such as cocaine, codeine, digitoxin, and quinine, in addition to morphine, of which some are still in use (Newman et al., 2000; Butler, 2004; Samuelsson, 2004).

Isolation and characterization of pharmacologically active compounds from medicinal plants continue today. More recently, drug discovery techniques have been applied to the standardization of herbal medicines, to elucidate analytical marker compounds. Drug discovery from medicinal plants has evolved to include numerous fields of inquiry and various methods of analysis. The process typically begins with a botanist, ethnobotonist, ethnopharmacologist, or plant ecologist who collects and identifies the plant(s) of interest. Collection may involve species with known biological activity for which active compound(s) have not been isolated (e.g., traditionally used herbal remedies) or may involve taxa collected randomly for a large screening program. It is necessary to respect the intellectual property rights of a given country where plant(s)
of interest are collected (Baker et al., 1995). Phytochemists prepare extracts from the plant materials, subject these extracts to biological screening in pharmacologically relevant assays, and commence the process of isolation and characterization of the active compound(s) through bioassay-guided fractionation. Molecular biology has become essential to medicinal plant drug discovery through the determination and implementation of appropriate screening assays directed towards physiologically relevant molecular targets. Pharmacognosy encapsulates all of these fields into a distinct interdisciplinary science.

In the earlier days, only the external morphological characters were used to identify a drug. As late as the beginning of the present century, pharmacognosy had developed mainly on the botanical side, being particularly concerned with the description and identification of drugs both in their whole state and in powder form. Modern aspects of pharmacognosy includes not only crude drug but also their natural constituents and their derivatives. Various pharmacognostical methods are evolved to standardize crude drugs. The use of medicinal plants as antiinflammatory and antiarthritic drugs in medicine is a practice common in India, although in most cases, the active principles of the plants are unknown. However, evaluation of the pharmacological effects of the herbal crude extracts can still be used as a logical research strategy in the search for new drugs.

The compounds, especially from natural sources, capable of protecting against ROS mediated damage may have potential application in the prevention and curing of diseases. Today, there is an urgent need to develop safer drugs for the treatment of inflammatory disorders, diabetes, cancer, liver diseases, and gastrointestinal disorder. Hence, there is a growing interest in the pharmacological evaluation of various plants used in Indian traditional systems of medicine. Comparatively less work is done in
morphological, phytochemical and pharmacological aspects of varieties of medicinal plants. And to fulfill this gap, the present work is undertaken with a view to analyze, pharmcognostical, phytochemical and pharmacological characters of the two *Jatropha* species with medicinal value. These plants are commonly available and medicinally useful and this study would form a foundation for understanding the pharmacological and therapeutical effectiveness of these species.

Of the 386 families and 2200 genera in which medicinal plants are recorded, the families Asteraceae, Euphorbiaceae, Lamiaceae, Fabaceae, Rubiaceae, Poaceae, Acanthaceae, Rosaceae and Apiaceae share larger proportion of medicinal plants (Chandel *et al*., 1996). The family Euphorbiaceae includes about 4000 species and 200 genera. The members of the family exhibit almost all habits of growth and are distributed all over the world except artic, antarctic region. The members of the family secrete an acrid juice of varying colours and density. Some species are slightly narcotic, acrid and others aromatic. The genera like *Phyllanthus, Jatropha, Acalypha, and Euphorbia* are used in modern allopathic and homeopathic systems of medicine.

*Jatropha* is a diverse and widespread genus includes about 175 species (Airy Shaw, 1982). 12 species of *Jatropha* are found to occur in India and 9 species in South India. The extract from different parts such as leaf, stem and bark of the *Jatropha* plant have been used in ethnomedicines for a long time to cure various diseases (Duke,1988). *Jatropha* species are known for many biological activities such as anticancer, antitumour, antimicrobial, hepatoprotective and pesticidal. These plants are also used as antipyretic, diuretic, cholertic and purgative (Kaushik and Kumar, 2004; Panda *et al*., 2009). For the present study, the two taxa - *Jatropha gossypifolia* L. and *Jatropha maheswarii* Subram. & Nayar are selected.
The plant *Jatropha gossypifolia* L. occurs in wastelands. The roots, stems, leaves, seeds, and fruits of the plant have been used in traditional folk medicine in many parts of different countries. The young stem of plant is used as tooth brush as well as to clean the tongue in the treatment thrush (Ogundare, 2007). The leaves of *Jatropha gossypifolia* are used for intermittent fevers, carbuncles, eczema, itches and sores on the tongues of babies, swollen mammae, stomach ache and venereal disease and as blood purifier (Balee, 1994). In south Nigeria, the fresh leaf extract applied with crushed leaf by herbalists and local people used to stop bleeding from skin and nose (Morton, 1981; Omoregbe *et al*., 1996). The plant *Jatropha maheswarii* Subram. & Nayar is a medicinal plant **endemic to South India**. It is restricted to the red clayey soils of the coastal regions of Tirunelveli, Thoothukudi and Kanyakumari districts of Tamil Nadu (Ahmedullah and Nayar, 1986). The plant is widely used by the local people to cure rheumatism, eczema and ringworms. Fresh stem is used as tooth brush.

From the perusal of literature, it is found out that there is fragmentary reports on *Jatropha gossypifolia* and *J. maheswarii* is unexplored for its medicinal properties. In view of this fact, the present investigation is undertaken to elucidate the pharmacognostical characters, phytochemical profile and pharmacological potential of the above mentioned taxa with the following objectives.

**Objectives:**

- To elucidate the macroscopic and microscopic characteristics of the aerial parts of *Jatropha gossypifolia* L. and *Jatropha maheswarii* Subram. & Nayar to establish the pharmacognostical standards of the plants.

- To carry out pharmaco-chemical characterization of leaf and stem of the two selected taxa through ash and extractive values, fluorescence analysis
and preliminary phytochemical screening to establish the phytoconstituents present.

- To study the HPTLC profiles of methanolic extracts of leaf and stem of selected taxa to confirm the presence of alkaloids, phenols and flavonoids.

- To study the GC-MS analysis of methanolic extracts of leaf and stem of the two selected taxa to identify the phytoconstituents present in the plants.

- To evaluate the antioxidant activity of leaf extracts of the two selected plants in different solvents by different radical scavenging methods and method based on reducing ability of extracts.

- To evaluate the anticancer activity of leaf methanolic extracts of the two selected taxa in EAC (Ehrlich's ascites carcinoma) induced rats.

- To investigate the antidiabetic activity of leaf methanolic extracts of the taxa in alloxan induced diabetic rats.

- To evaluate the hepatoprotective activity of leaf methanolic extracts of the selected taxa in carbon tetrachloride (CCl₄) induced liver damage in rats.

- To evaluate the antiinflammatory activity of leaf methanolic extracts of the plants in carrageenan induced paw edema in rats.