CHAPTER- 1

INTRODUCTION

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The first example of the use of herbs as medicines dated back to the very dawn of mankind. Archaeologists have recently found evidence of the use of medicinal herbs by Neanderthal man in Iraq some sixty thousand years ago. All of the ancient civilizations - the Mesopotamian, Egyptian, Greek, Chinese, Indian and Roman used herbs as an integral part of their various medicinal systems. The Most famous herbalist Hippocrates, the first physician to stress the importance of nature in healing, is known as the 'Father of Medicine'.

India had a rich heritage of traditional as well as folklore practices. The earliest recorded evidences of use of herbal medicines date back to about 5000 years. Ayurveda is said to be the oldest tradition of medicine in India and Charak is the father of this science. Subsequently many additions, amendments had been made by the followers of Ayurveda. Besides Ayurveda, other traditional systems such as Siddha, Unani, Aamchi were also being practiced in India. The herbal and traditional medicines practiced today, therefore, had been derived from rich traditions of ancient civilization and scientific heritage. Plant based products therefore are valued even today and found exclusive use in household remedies, ethno medicines and traditional systems of medicines. The major traditional sectors Pharmas including Himalaya, Zandu, Dabar, Hamdard, Maharishi, etc. and modern sector pharmas like viz. Ranbaxy, Lupin, Alembic, etc. were well known for manufacturing herbal formulations. About 7000 firms in small-scale sector in India are manufacturing traditional medicines and around 25,000 formulations based on plants are used by more than 1.5 million practitioners for health care (Narayana, 1998).

Indian Materia Medica (Nadkarni, 1954) covered about 2000 drugs of natural origin, out of these 400 were of mineral and animal origin while rests were of plant origin. According to Ved Prakash (998) 3000 flowering plant species were recognized for their medicinal usage of which approximately 2000 species were used in ethno medicine, where as 1500 species were used in Indian systems of medicine like Ayurveda, Siddha and Unani. Out of these, only 550 species were very commonly employed in commercial preparation of herbal formulations.

Herbal drugs are becoming more popular globally may be due to the problems being faced with synthetic drugs. Moreover, modern medicines did not have effective remedies for the chronic diseases and age-related problems. Ever-increasing demand

therefore, was found for the herbal medicines in the global market as these were biologically more compatible with human systems, comparatively less toxic than synthetic drugs, cheap and enjoyed the faith of common people due to traditional use for generations and 'return to nature' moved in developed and in developing countries (Dhawan, 1995). Recently National Institute of Health, USA had recognized needs for complementary and alternative medicines and National Centre had been setup for scientific research in this area (Patwardhan *et al.*, 2008). In USA the sale of plant based products showed an increase of 40% during 1992 - 1996 were as of US 14 billion dollars in 1996. In European countries also there was a significant increase of plant based products (Schilter *et al.,* 2003). Import of medicinal plants recorded increase in Japan and European countries (Wakdikar, 2004). India being the biodiversity centre, in global market it was considered as one of the potential exporting countries of medicinal plants. It was estimated that pharmaceutical companies engaged in plant based products showed about 15% production growth per annum (Kumar, 2003) but still its share in the World trade was only 0.04%. To manufacture these formulations the estimated annual consumption of medicinal plant material was about 2000 tonnes (Wakdikar, 2004).

The use of medicinal plant resources in India was quite sustained till almost 18th century, where in the herbal practitioners - Vaidya's, Hakims or the tribal healers were collecting the required herbals of their own. In course of time this tradition changed because of Advent of modern medicine as well as establishment of herbal industries. Even today, more than 80% of the plant resources used in traditional medicine as well as for fulfilling the industrial demands is harvested from the wild through a chain of people without regard to how the plants would survive for the future. Many medicinal plants were under threat due to over-collection and destructive harvesting practices. Moreover, the data on exploitation levels, exact turnover of crude drug resources and the measures on stock availability in nature however, was meagerly available or so to say not disclosed as a part of secrecy (Singh, 2002). These unorganized collections were posing a great pressure on biodiversity particularly wild plant resources of medicinal importance.

To maintain quality and efficacy of drugs, use of proper plant material was essential. Resources on the other hand were depleting at an alarming rates. Fulfillment of these increased demands, therefore, led towards substitution and adulteration of resources. In the process authentic plant materials were adulterated or substituted by easily available other alike species. The most important fact was lack of suitable regulations for governing identity and quality control in this system.

In view of overcoming difficulties a National Medicinal Plant Board (NMPB) was established in 2000 which dealt with conservation of resources and quality of products. Important aspects like survey and inventory of medicinal plants *in-situ*, *ex-situ* conservation, large scale multiplication and production of resources and research and development of medicinal plants sector. Recently India had amended the 'drug act 1940' which facilitated development of plant drugs based on traditional knowledge and clinical observations using reverse pharmacology with evidences of quality, safety and efficacy (Patwardhan *et al.*, 2004; Mukherjee, 2003, 2005). The search for under-utilized lesser known resources mentioned either in Indian Materia Medica (Nadkarni, 1954) or found in ethno-medicobotany literature (Kirtikar and Basu, 1935; Jain, 1991) had become essential in this endeavor. Considering this fact, now a days there was a growing interest in the evaluation of various plants for their potential use as alternative or new potent species.

The standardization of crude drug resources included traditional pharmacognostic evaluation coupled with phytochemical analysis such as TLC, HPTLC, HPLC fingerprints (Ayurvedic Pharmacopoeia of India 1989; Trease and Evans, 1983) and the biological activity. In recent years, there are also increase trends of search for antimicrobial properties (Harvey, 2007; Lee *et al.*, 2007; Hostettmann *et al.*, 2003) and antioxidant potentials of crude drugs.

In market many crude drugs are sold under the same name or sometimes same drug was sold under various local names (Handa *et al.*, 1951). In some cases there was controversy regarding identity and efficacy of crude drugs viz. Brahmi and nerbrahmi (*Centella asiatica* L. and *Bacopa monniera* L.), safed musali (*Asperagus adscendens* Roxb., *Chlorophytum arundainaceum* Baker., *Chlorophytum borivilianum* Sant. & Fernand.) etc. 'Karmarda' commonly known by the name Karonda was also one such example.

'Karmarda' was a plant mentioned in ancient literature under Rhidyagana, however, was under-utilized. Stanzas as well as different synonyms describing plant characters were inadequate for deciding correct botanical identity (Trivedi, *et al.,* 1963). All Indian species of genus *Carissa* L. were also known by the common name Karonda and floristic and taxonomic literature indicated confusions in correct identity at species level because of major diversity within and between the species (Hooker, 1882; Cooke, 1901-08; Talbot, 1909-11; Santapau, 1960; Ghate *et al.,* 1997, 1999).

A Project on study of diversity and distribution of genus *Carissa* L. was undertaken at Agharkar Research Institute (ARI). Extensive field surveys were carried out throughout India for documenting diversity at inter-specific and intra-specific levels (Ghate *et al*., 1997, 1999). During the survey, special efforts were made to document ethnobotany of *Carissa* L. species from local informants. Ethnobotanical literature was screened for the utilities of species all over India. Ethno-claims were compared with known uses from Ayurvedic literature. Roots and fruits were well reported in Indian system of medicine particularly as cardio-tonic but not commonly practiced.

'Karmarda' had been included in ten drugs which are cordials (Charak Samhita, Su. 4/10). The same had been mentioned in Amalakagana of Sushrut Samhita (Su. 10/26-26). These properties had been reported for *Carissa carandas* L. (Bhavprakash of Bhavmishra, 2004; Hebber *et al*., 2003; *Satyavati et al*., 1976). Presences of cardiac glycosides had been reported in fruits of *Carissa carandas* L. and *Carissa congesta* Wight (Morten and Miama, 1987; Singh and Rastogi, 1972). Cardiac glycosides had also been reported in roots of *Carissa carandas* L., *Carissa congesta* Wight, *Carissa opaca* Stapf ex Haines and *Carissa spinarum* L. (Morten and Miama, 1987; Singh and Rastogi, 1972). Use value of roots on cardiac problems had not been reported in ancient literature as well as ethno-medico-botany (Jain, 1991). Usage of roots leaves and fruits of *Carissa congesta* Wight*, Carissa carandas* L.*, Carissa opaca* Stapf ex Haines and *Carissa spinarum* L. for number of ailments had been reported in ethnobotany literature (Jain, 1991).

In view of this, present study work was planned for evaluating pharmacognostic standards for four medicinally important species of genus *Carissa* L. viz. *Carissa congesta* Wight*, Carissa carandas* L.*, Carissa opaca* Stapf ex Haines and *Carissa spinarum* L. The work had been carried out with following objectives-

- Collection of Plant material of *Carissa congesta* Wight*, Carissa carandas* L*, Carissa opaca* Stapf ex Haines and *Carissa spinarum* L. from various places covering fruiting seasons.

- To compare different *Carissa* L. species by taxonomical, anatomical and pharmacognostic investigations to evolve the pharmacognostic standards for all four species.

- To carry out chromatographic studies viz. Thin Layer Chromatography (TLC) and High Performance Thin Layer Chromatography (HPTLC) after solvent extraction.

- Screening for antimicrobial activity for root of all four species.

Species were standardized as per WHO guidelines particularly for macro-characterization, micro-characterization and phyto-chemical contents. The species were also studied for the antioxidant capacities and antimicrobial properties. Roots, leaves and fruits mentioned for medico-properties had been evaluated for these standards. Results obtained had been compiled in the thesis form.

This is a first attempt towards resolving controversy in species delimitation in medicinally important species of *Carissa* L. using pharmacognostic tools. The work has provided additional dimension to resolve taxonomic ambiguity in genus.