INTRODUCTION TO STUDY AREA
The Western Ghats also known as the Sahyadri Mountains, is a mountain range along the western side of India. It runs north to south along the western edge of the Deccan Plateau, and separates the plateau from a narrow coastal plain along the Arabian Sea. The range starts near the border of Gujarat and Maharashtra, south of the River Tapti, and runs through the states of Maharashtra, Goa, Karnataka, Tamil Nadu and Kerala ending at Kanyakumari (Tamil Nadu) at the southern tip of India. The proportion of the forest area in Western Ghats is 79%, which is remarkably high for any district in India. People have harvested such forest products as Black pepper (*Piper nigrum*), Cardamom (*Elettaria cardamom*), and Cinnamon (*Cinnamomum zeylanicum*) and *Garcinia* (*Garcinia gummigutta* and *Garcinia indica*) from the wet tropical forests of the Western Ghats, which have provisioned Arabian kitchens from the 9th century and European larders from the 15th century (Ramesh and Pascal, 1998).

### 2.1. HISTORY OF WESTERN GHATS

The Western Ghats are not true mountains, but are the faulted edge of the Deccan Plateau. They are believed to have been formed during the break-up of the super continent of Gondwana some 150 million years ago. Geophysicists Barron and Harrison from the University of Miami advocate the theory that the west coast of India came after it broke away from Madagascar. After the break-up, the western coast of India would have appeared as an abrupt cliff some 1,000 meters in height.
Soon after its detachment, the peninsular region of the Indian plate drifted over the Reunion hotspot, a volcanic hotspot in the Earth's lithosphere near the present day location of Reunion. A huge eruption is thought to have laid down the Deccan Traps, a vast bed of basalt lava that covers parts of central India. These volcanic up thrusts led to the formation of the northern third of the Western Ghats. These dome-shaped uplifts expose underlying some rocks which is observed in some parts such as the Nilgiri Hills.

### 2.2. GEOGRAPHY, CLIMATIC CONDITION AND SOIL TYPE

Western Ghats extends from 8° N to 22° N, a length of about 1600 km, and run parallel to the western coast of India. The hills rise sharply from the coast to varying heights, about 2400 m at their highest, and recede gradually towards the east. The western escarpment catches the moisture laden monsoon winds that sweep in from the Indian Ocean during the months of June to October. There is a north-south gradient in rainfall with both the amount of rain and number of wet months decreasing with increasing latitude. The altitudinal and rainfall gradient have resulted in a diversity of habitats and high levels of endemicity of plant and animal species (Bhat et al. 1986, Daniels 1991). The wellbeing of the growing world population depends on the availability of biodiversity.

Climate in the Western Ghats varies with altitudinal gradation and distance from the equator. The climate is humid and tropical in the lower reaches tempered by the proximity to the sea. Elevations of 1,500 m (4,921 ft) and above in the north and 2,000 m (6,562 ft) and above in the south have a more
Introduction to study area

temperate climate. Average annual temperature here is around 15 °C (60 °F) In some parts frost is common, and temperatures touch the freezing point during the winter months. Mean temperature range from 20 °C (68 °F) in the south to 24°C (75 °F) in the north. During the monsoon season between June and September, the unbroken Western Ghats chain acts as a barrier to the moisture laden clouds. The heavy, eastward-moving rain-bearing clouds are forced to rise and in the process deposit most of their rain on the windward side. Rainfall in this region averages 3,000–4,000 mm with localized extremes touching 9,000 mm.

The eastern region of the Western Ghats which lie in the rain shadow, receive far less rainfall averaging about 1,000 mm bringing the average rainfall figure to 2,500 mm. Some areas to the north in Maharashtra while receiving heavier rainfall are followed by long dry spells, while regions closer to the equator receiving less annual rainfall, have rain spells lasting almost the entire year.

The soil profile is characterized by unweathered rocks and the nutrients are concentrated in the humus layer. The soils of the study area belong to Archaean rock derived Dharwar schists, which are largely ferrallitic soils belonging to the Udalf group (Order Alfisols in a high moisture regime) and the Tropepts group (Order Inceptisols) (Bourgeon 1989).

2.3. IMPORTANCE OF Garcinia Species IN WESTERN GHATS

India is the centre of origin for many tropical fruit tree species, most of which are not commercially cultivated but provide a significant source of livelihood support for many rural communities. Besides their importance for their nutritional value and as a source of household income, this fruit diversity also has
a cultural and social value and contributes to the stability of ecosystems (Arora, 1998). Many tropical fruits are labeled as “underutilized species”, which are characterized by the fact that they are i) locally abundant, but restricted in their geographical dispersion and have a high use value, ii) there is a lack of scientific knowledge about them, and iii) that their current use is limited relative to their economic potential (Gruere et al., 2006). *Garcinia* is one of such underutilized species in India, which is abundant in Western Ghats and is considered to have great potential as a spice and medicinal plant (Korikanthimath and Desai, 2005).

Both the pulp and oil extract from the seeds of *Garcinia indica* and *Garcinia gummignutta* are used for a range of purposes. These trees are one of the essential parts of the natural forest vegetation and thus available in the wild, they are utilized by collectors of forest resources (such as non-timber forest products) and form an important source of livelihood support for the families dwelling close to these natural habitats. In addition to these benefits, economic benefits derived from *Garcinia* are of significant importance for these rural economies also. The genus *Garcinia* is one of the five genera belonging to the Clusiaceae (Guttiferae) family that are represented in South and Southeast Asia. Six out of 30 species that occur in India are included in the IUCN Red List of threatened species and thus under threat to become extinct. *Garcinia indica* or kokum, is a native of the Western Ghats in India, and Malaysia. In India it mainly grows in the western parts of Maharashtra, Karnataka, Kerala, and Goa. In this context, the diversity, chemical, and molecular profiling of *Garcinia* species requires a great importance.
Genetic Resources of Indian *Garcinia* species have been neglected till, leading to most of the Indian species facing threat of extinction or are in the threatened state. Conservation in the field gene bank, *in vitro* gene bank, Cryo bank and *in situ* on farm are complementary to each other leading to comprehensive conservation strategy. Greater emphasis on management of Indian genetic resources of *Garcinia* is required by collection, characterization and conservation to safeguard and sustainable utilization (Abraham, 2010). There is an urgent need to identify superior genotypes and also to develop vegetative propagation techniques for economically important, commercial exploitation and popularization of *Garcinia* genetic resources in Western Ghats.