CHAPTER 4

AREA OF STUDY

The Eastern Ghats or Purva Ghats are a discontinuous range of mountains along India’s eastern coast. The Eastern Ghats run from West Bengal state in the north, through Odisha and Andhra Pradesh to Tamil Nadu in the south passing some parts of Karnataka. The mountain ranges run parallel to the Bay of Bengal. These ranges are not as high as the Western Ghats. It covers a total area of around 75,000sq.km. One of the important characteristics of Eastern Ghats lies in its being extremely fertile. In fact, the ghat is said to be the watershed of many rivers as the ghat gets higher average rain fall. There is diversity in vegetation that includes the tropical moist deciduous type, tropical dry deciduous type etc., (Samata, 2011).

As study area for the work, two zones of Eastern Ghats have been selected from Visakhapatnam district namely Visakhapatnam City(Polluted site) and Chintapalli (Control site). The polluted site is a large residential area at lower altitude of Eastern Ghats, where there are more than fourteen major hazardous industries, among which several are present in Gajuwaka area namely HPCL (R), HPCL (T), IOCL (T), LPG Bottling plant, APCL, BPCL(T), Steel plant etc. The soil and medicinal plants thriving in Gajuwaka area are chosen as source of industrially polluted zone. This area is polluted with various heavy metals due to industrial activities mentioned above. These substances may exert abiotic stress on the plant species that inhabit those areas.
Elevated levels of both essential and non-essential heavy metals pose serious threat for human health and agriculture. The excessive uptake of these metals from the soil can create dual problem. Firstly the harvested crops which are contaminated serve as a source of heavy metals in our food supply and secondly yields are reduced due to adverse effect on plant growth (Bala and Setia, 1990; Hall, 2000). These non-degradable heavy metals are important environmental insidious pollutants and also a cause of potential ecological risk.

To compare the data, the selected second area of the study is Chintapalli of Visakhapatnam district located at the higher altitude in the hilly tracts of Eastern Ghats of Andhra Pradesh. The soil and the same species of plants, flourishing in Chintapalli division of Visakhapatnam district, are collected. The site at which the plants have been collected at Chintapalli is considered to be free from industries and the biosphere is less polluted and therefore it has been selected as a control site to compare the data.

Chintapalli is set amid the serene lush green hills of Eastern Ghats about 100 km from Visakhapatnam city. It is inhabited by hill tribes like the Gadabas, Valmikis, Bagatas and primitive tribes like the Porjas. Each tribe has its own hamlet set in the woods. It is at an altitude of 839 meters (2755 feet), with the coordinates 17°52'10"N 82°21'7"E.

Most of the medicinal plants belong to the higher flowering plants. Analysis of medicinal plants indicates that they are distributed across diverse habitats. Around 70% of India’s medicinal plants are found in tropical areas mostly in various forest types spread in Western and Eastern Ghats. Less than 30% are found in temperate and alpine areas and higher altitudes.
The effect of pollution on flora and fauna is a burning global issue. Eastern ghats located at industrial area of Visakhapatnam is one of the rich districts of Andhra Pradesh with rich biodiversity and good forests (Padal S.B. et al., 2010). Therefore the soil and several plant specimens used in traditional medicine have been collected based on ethnomedical significance to study the effect of industrial metal pollution.

Upon studying the contaminated sites of Eastern Ghats with respect to plants exhibiting luxuriant growth, a few plants have been selected that are known to have curative action on respiratory ailments along with other general medicinal properties. The study site is contaminated with heavy metals that have mainly originated due to industrial activity in Gajuwaka area of Visakhapatnam.
MAP OF STUDY AREA
CHAPTER 5

RESULTS AND DISCUSSION

Eastern Ghats is known for rich vegetation in terms of medicinal plants. Upon studying the contaminated sites of Eastern Ghats located at Visakhapatnam industrially polluted areas with respect to plants exhibiting luxuriant growth, five plant species have been selected that are known to have curative action on respiratory ailments along with the other general medicinal properties (Plate 1). The contaminated site of our study is polluted by heavy metals that mainly originate due to industrial activity in Gajuwaka area of Visakhapatnam (Plate 2). These metals may exert abiotic stress on the plant species that inhabit the industrially polluted areas. The range of pollutants may adversely affect the growth and development of cultivated plants, crops and vegetables too (Anthony and Singh, 2006). These factors or range of pollutants may impose an abiotic stress on medicinal plants too, which may alter metabolic profiles and developmental trajectories and thereby induce the production of various secondary metabolites. This in turn assists the plants to adopt to varied environmental changes.

Among crop plants (such as wheat, corn, barley, soyabean, potato, sugar beet) record yield and average yield is accounted by abiotic stress (Bray et al., 2000).