Preface

Earthworms are important in the soil doing great service for mankind for millions of years. It combines immense social, economic and environmental values together which are now being realized and recognized. Earthworms “The golden bough of our agricultural history” are responsible for mechanical mixing of soil and play a major role in maintaining physical soil characteristics and processes such as aeration, water permeability and mineral turnover. In this way they have the ability in recycling of organic waste and production of organic fertilizer (Darwin, 1981). Earthworm is the common name for the larger member of the the Oligochaeta of phylum Annelida. They are described as segmented bristle bearing worms contributing large to the biomass of soil invertebrates particularly in the temperate and tropical regions of the world (Edwards and Lofty, 1972; Julka, 1993; Ismail, 1997, 2005; Kooch et al., 2008). These are one of the major macrofauna of soil and are considered as unheralded soldiers of the soil. Earthworms have the ability to improve soil structure, contribute to the breakdown of organic matter and release plant nutrients (Edwards and Bohlen, 1996). Earthworms when present in soil inevitably work as ‘soil conditioner’ to improve its physical, chemical and biological properties and also its nutritive value for healthy plant growth.

A greater proportion (80%) of biomass of terrestrial invertebrates is represented by earthworms. Earthworms are long, narrow, cylindrical, bilaterally symmetrical, segmented invertebrates measuring few centimeters. Tropical worms are bigger and robust. An exceptionally big species about a meter long is reported from Victoria in Australia having body dark brown, glistening and covered with delicate cuticle. Usually the life span of an earthworm is about 3 to 7 years depending upon the type of species and the ecological situation (Edwards et al., 1972; Gunathilagraj., 1996). Earthworms act as ‘Ecosystem Engineer’ converting a product of ‘negative’ economic and environmental value i.e. ‘waste’ into a product of ‘highly positive’ economic and environmental values i.e. ‘highly nutritive organic fertilizer’ (brown gold) and ‘safe food’ (green gold) (Sinha et al., 2009).
Earthworms fall into three ecological niches: epigeic (upon the earth), endogeic (within the earth), and anecic (up from the earth). Night crawlers fall into the anecic category. Earthworms have an important impact on soil fertility and soil permeability (Wang et al., 2004), but it remains to be known about the factors that influence earthworm abundance and species diversity in agricultural soil and the impact of earthworm diversity on soil processes (Patrick et al., 1995).

There is an exponential relationship between the ambient temperature and metabolic rate of animal to some extent. Temperature may be an important factor related to the metabolism of earthworms (Hochachka and Somero, 1984; Gracey et al., 1996; Crockett et al., 2001). It is well known that soil invertebrates vary in their sensitivity to pollutants (Lock and Janssen, 2001a,b; Amorin et al., 2005). Generally, salinity affects crop yield and beneficial soil biota, leading to economic losses. It affects the growth and survival of soil microorganisms (Yuan et al., 2007) and soil animals (Hobel et al., 1992; Owojori et al., 2008). In field earthworm exposure is strongly dependent on the degree of deposition of pesticides on the soil surface, on the behavior of the pesticide in the soil and on the vertical distribution of earthworms in the soil. The soil ecosystem is very complex where interaction between abiotic and biotic factors occurs (Yasmin et al., 2010).

Studies on the basic taxonomy, biometry and to some extent biology of the earthworms are quite extensive but effect of soil texture on their survival and various physiological activities are sparsely known. Large amount of insecticides, herbicides, fungicides etc are indiscriminately applied to the soil to control pest. In addition to this large amount of fertilizers, heavy irrigation used in agricultural practices also caused erosion of soil texture and salination is one of the major factors.

In order to provide some significant additional information about the toxicity of pesticides (monocrotophos and endosulfan), and impacts of temperature and salinity the earthworm *Eudrilus eugeniae* has been selected as a model for present investigation. This study is thought necessary to find out some of neglected aspects of pesticide toxicity, salinity, temperature on some physiological activities of earthworm *Eudrilus eugeniae*.
Eudrilus eugeniae belongs to Megascolecidae family. It grows well at a temperature 24-29 C. Maximum weight occurs within 8-10 weeks. The data obtained during the study of past two years are compiled and have been presented through three chapters as follow.

**Chapter 1**: This chapter contains survey and identification of earthworms in soil of university campus and around Aurangabad. 8 species have been found which are given with their systematics and characters. The *Eudrilus eugeniae* species selected for research work. Soil ecology and bionomics of *Eudrilus eugeniae* are given in detail.

**Chapter 2**: This chapter deals with analysis of physico-chemical characters like pH, salinity, organic matter, total nitrogen, phosphorus etc. of selected site for the period of two years. Variation in physico-chemical parameters is correlated with each other.

**Chapter 3**: This chapter deals with the studies on thermal, salinity, and pesticide tolerance limits determined by graphical and statistical methods. Effect of temperature, salinity and pesticides on changes in central nervous system, digestive system and enzymes, excretory product such as urea and uric acid and biochemical changes in whole body tissue and nephridia of *Eudrilus eugeniae*. Histological changes in brain, intestine, testis and ovary as a function of effect of temperature, salinity and pesticide are also given in this chapter. Earthworms are ecologically important in fields; hence there is an economic interest in testing side effect of environment factors like temperature, salinity and pollutants on its biological aspects. Thus the aim of this work is to find out the effect of changing environmental conditions on the life security of earthworms *Eudrilus eugeniae* (Kingberg, 1867).