Earthworms are an important food for vertebrates and have a major role in regulating physical, chemical and biological processes in the soil. Earthworms are a major component of the animal biomass of terrestrial ecosystems where they play several biological roles; as food for other organisms, interact with plant roots and soil microorganisms, chemical and physical reactions which affect soil fertility.

But these worms are often exposed to a wide range of anthropogenic compounds released into the terrestrial environment. As a consequence, they suffer from the toxicity of these compounds. For these reasons, earthworms have been used extensively in ecotoxicological studies. Ecotoxicity tests that exploit various functional endpoints in earthworms, including behaviour and life cycle parameters, are regularly used to assess the risks associated with soils contaminated by chemicals (organic/inorganic residue mixtures).

The present study had a strong focus on practical aspects of the effect of herbicide on the earthworms. Butachlor is one of the most commonly used herbicides in South India and is frequently detected as soil pollutant. Studies have also been made on the changes in biomass, clitellum development, cocoon production and hatchling successes.
Histological observations were made after 60 days of exposure and also the residual content of herbicide in the body of earthworms was determined.

The major findings of the study are as follows,

1. Based on biomass estimation in *Lampito mauritii*, *Perionyx sansibaricus*, *Eudrilus eugeniae* and *Eisenia fetida* it was found that both indigenous earthworms *Lampito mauritii* and *Perionyx sansibaricus* had the inhibitory effect on the biomass. But the other two exotic earthworms *Eudrilus eugeniae* and *Eisenia fetida* showed very little variation in mean biomass.

2. Butachlor could, of course have affected the feeding behavior which in turn could have affected the growth and reproduction indirectly.

3. There was no significant difference between the maturation rates of the control worms in all exposure groups in the present study. The maturation rate could not therefore be considered as a sensitive parameter to evaluate the effect of the herbicide butachlor.

4. The histopathological studies were carried out in the intestine of *Eudrilus eugeniae*, *Eisenia fetida*, *Perionyx sansibaricus* and *Lampito mauritii*. The major histopathological lesions detectable in the intestine were cavitation, cellular dissociation, necrosis, hypertrophic, vacuolation, pyknosis, karyolysis, loss of compactness, extra villous growth and fused villi in epithelial lining and chloragogen tissue. All the four different species of earthworms in the higher concentrations displayed histological malformations or injury.

5. All these histological damage entirely devastated the architecture and they were observable more in the indigenous species *Lampito mauritii* and *Perionyx*
sansibaricus than in the exotic species of earthworm Eudrilus eugeniae and Eisenia fetida.

6. Though the severest form of lesions were detectable in the higher concentration of butachlor in all the four exposed species, a noteworthy feature of these histological lesions, was found to be fusion of inner intestinal walls. This may be due to loss of osmoregulation and energy supply.

7. In the detoxification process, earthworm requires more energy, but in all the higher concentrations of butachlor, the chloragogen tissue had less reserve inclusion. So the earthworms required more energy, and to obtain more energy from food the villous area was found to be increased.

8. The present results clearly indicate that butachlor retarded the growth and reproduction in Eudrilus eugeniae, Eisenia fetida, Lampito mauritii and Perionyx sansibaricus. The effect of herbicide butachlor can be assessed by the histological changes in intestinal region as evidenced by cellular enlargement and disintegration of chromatin body in all the exposed concentrations, which might have affected food intake massively and which in turn might have inhibited the reproductive capacity of worms.

9. In the present study, all the exposed four species (Lampito mauritii, Perionyx sansibaricus, Eudrilus eugeniae and Eisenia fetida) were able to accumulate or concentrate the herbicide butachlor in their tissues.

10. Generally, Perionyx sansibaricus, Eudrilus eugeniae and Eisenia fetida were able to feed on more food than Lampito mauritii and hence these three earthworms
were widely used for composting purpose. Based on the feeding habit these three worms were found to accumulate more herbicide than *Lampito mauritii*.

All these toxicological studies were aimed at protection of human health and protection of the ecosystem and the interrelationship of these two is easy to perceive. The use of earthworms in risk assessment is to obtain more information on environment quality and ensure environmental safety.