Earthworms play a key role in the degradation of soil organic materials and recycling of nutrients in soil ecosystem. A few species are widely used for the decomposition of organic waste materials such as agricultural wastes, industrial wastes and household wastes and for the production of vermicompost, which is used as manure for crop production. The present study is aimed at identifying efficient local earthworm species for vermiculture, observing their population dynamics, life cycle and composting efficiency and studying the utilization of vermicompost for plant growth.

Since the population biology provides the first basic information about any species and is regulated by both abiotic and biotic factors, a regular monthly survey on population and biomass dynamics and abundance of earthworm population with reference to various physico-chemical characteristics of the soil (pH, electrical conductivity, organic carbon and nitrogen) and climatic parameters (soil temperature, soil moisture, humidity and rainfall) was carried out in ten different sites located in and around Gandhigram Rural Institute, Gandhigram and Sirumalai Hills, Dindigul district, Tamil Nadu for a period of three years (1997-1999).

The survey showed the presence of ten different species of earthworms, *Lampito mauritii, Lampito kumiliensis, Dichogaster bolau, Dichogaster saliens, Megascolex insignis, Octochaetona thurstoni, Drawida chlorina, Drawida pelucida pallida, Drawida paradoxa* and *Pontoscolex corethrurus* in the plains region and
the hilly region of the study area. The population and biomass dynamics and percentage abundance of earthworm population showed wide fluctuation between species, between the months of collection and between the collection sites. Correlation studies with physico-chemical parameters and climatic parameters showed that the percentage contribution of nitrogen, organic carbon, soil moisture, humidity and rainfall had a positive influence on the dynamics of earthworm population.

In order to assess the vermicomposting efficiency of locally abundant earthworm species, preliminary vermicomposting studies (90 days) were carried out with seven different earthworm species that were locally abundant, using three different kinds of organic materials i.e. leaf litter of *Polyalthia longifolia, Pennisetum typhoides* cobs and *Rottboellia exaltata* in combination with cowdung (1:1). The results showed the possibility of using *L.mauritii* and *P.ceylanensis* for vermicomposting of organic waste materials for the production of vermicompost. Further vermicomposting trials showed that 60-80 and 90-120 worms of the species, *L.mauritii* and *P.ceylanensis* respectively were sufficient to convert 4 kg of waste materials into vermicompost in 120 and 90 days respectively. The plant nutrients (NPK and Ca, Mg and Fe) and colony forming units of bacteria, fungi and actinomycetes were found higher in the worm-worked vermicomposts than in the worm-unworked composts.

A 340-day observation of the growth and reproduction of *L.mauritii* and *P.ceylanensis*, showed that the mean age of clitellum development was 54.33 days for *L.mauritii* and 22.00 days for *P.ceylanensis*. The duration of lifecycle of *L.mauritii* and *P.ceylanensis* was ±101 days and ±50 days respectively.

To find out the effect of vermicompost on plant growth, three types of plant growth studies were carried out i.e. layering experiments with an ornamental
plant, *Codiaeum variegatum*, pot culture studies with a pulse crop, *Vigna mungo*, and field trials with a vegetable crop, *Lablab purpureus*. The 45-day layering studies with peat mass, vermicastings, vermicastings+peat mass showed that root initiation, root length, number of roots, fresh weight and dry weight of roots of *C.variegatum* were higher in vermicastings and in the mixture of vermicastings+peat mass than in peat mass. The 75-day pot culture studies on *V.mungo* using farm yard manure, chemical fertilizer and vermicompost showed a significant difference (P<0.05) between the vermicompost applied pots and the farm yard manure applied pots, while no significant difference was observed between the chemical fertilizer applied pots and the vermicompost applied pots. The 180-day field trial with *L.purpleus* showed that all the growth and yield parameters i.e. day of first flower appearance, leaf area index, total chlorophyll content of leaf, number of primary branches/plants and total dry matter production were significantly (CD. at 0.05) higher in the plots which received vermicompost, chemical fertilizer and vermicompost+chemical fertilizer mixture than in the control, signifying the possibility of replacing chemical fertilizer by vermicompost.

*L.mauritii* and *P.ceylanensis* were found to be efficacious for decomposition of organic wastes and production of vermicompost, which is an ^co-friendly manure for crop production. The results of the life cycle studies indicates that *P.ceylanensis* is more efficient for vermicomposting technology in his part of India because it has a short incubation period and high fecundity than *-mauritii*. This is the first report on the vermicomposting potential of ^-ceylanensis.