MATERIAL AND GENERAL EXPERIMENTAL PROCEDURES
OZIOTELPHUSA senex senex
THE FRESH-WATER FIELD CRAB
1. MATERIAL:

OZIOTELPHUSA SENEX SENEX

Oziotelphusa senex senex (Fabricius) is a freshwater field crab commonly available in the paddy fields around Anantapur and many districts of Andhra Pradesh. It makes burrows in soft mud along the edges of paddy fields and canals and lives in them partially filled with water. In a sense it can be described as semi-terrestrial as it lives partly immersed in water and can live for longer periods on land. Besides their wide availability and commercial importance, crabs are very easy to collect, handle and maintain in the laboratory. They are known to have a good adaptability to laboratory conditions in general and seem to be ideal experimental material in toxicity studies in particular.

BIOLOGY OF OZIOTELPHUSA SENEX SENEX

A brief account of the biology of crab involved in the investigation may provide a good preamble to this study. The freshwater field crab O. senex senex (Fabricius) which is formerly known as Paratelphusa hydrodromus (Herbst) is a decapod crustacean normally inhabiting the paddy fields and irrigating canals of South India. It is carnivorous feeding on worms, insects etc. It is also a cannibal
feeding on younger crabs. It is not found either in brackish water or sea-water and hence it is a strict in-habitant of fresh-water and yet it has the unique capacity to tolerate even direct transfer to 100% sea-water. Interestingly Oziotelphusa is a eurythermal (Pampapathi Rao, 1962 and Venkat Reddy, 1962) as it is euryhaline (Ramamurthy, 1962, 1965; Venkat Reddy, 1976). The pollution of fresh-water environment through the spraying of pesticides in the paddy fields and ponds cause physiological damage to the crabs. This crab is selected as the ideal experimental material for this investigation, are delicious in South India and is called as "Poor man's Protein".

POLLUTANT SELECTED

The present investigation deals with the evaluation of toxicity of malathion which is an organophosphorous pesticide. The commercial grade malathion was purchased from the local Fertilizer stores.

MALATHION

The commercial grade malathion is a member of organophosphorous family. It has the following chemical and physical properties.
Chemical name: O-O dimethyl phosphorodithioate diethyl mercapto succinate.

Empirical formula: \( C_{10}H_{19}O_6PS_2 \)

Structural formula:

\[
\begin{align*}
\text{CH}_3\text{O} & \quad \text{S} \\
\text{P} & \quad \text{S=CH-COOC}_2\text{H}_5 \\
\text{CH}_3\text{O} & \quad \text{CH}_2\text{-COOC}_2\text{H}_5
\end{align*}
\]

Physical properties:

Colour: It is a clear brown to colourless liquid.

Odour: Mercaptan like

Specific gravity: 1.2315 at 25° C.

Solubility: Soluble in water approximately 145 ppm at 25° C, completely soluble in most esters, high aromatic solvents and ketones. Poorly soluble in aliphatic hydrocarbons.

Boiling point: 156° C - 157° C under 0.7 mm pressure with slight decomposition.

Melting point: 2.85° C

Viscosity: 40° C – 17.57 centipoises
25° C – 36.78 centipoises

Refractive index \( n^D \) 25° C : 1.4985.

(The above information was collected from Technical Bulletin of Cyanamid India Ltd., Bombay).
Malathion is one of the safest insecticides, for it has an acute oral LD$_{50}$ in rats 900–5800 mg/kg (Matsumura, 1976). Malathion is a versatile organophosphorous insecticide widely used throughout the world to control crop pests, flies and mosquitoes because it is biodegradable and non-persistent insecticide seldom leaves residue (Fischer, 1966; Anon, 1966; Bookhout et al., 1977). Its entry into the aquatic environment causes havoc to the crabs and fishes (Darsie and Corrden, 1954; Mulla, 1961; Basha Mohideen and Subba Rao, 1982; Basha Mohideen and Parvathi, 1984). In view of the easy availability and versatility of malathion and its deleterious effects on crabs, malathion is selected as the ideal pesticide to investigate its effects on crabs in this investigation.

II. GENERAL EXPERIMENTAL PROCEDURES

MAINTENANCE OF CRABS, THE EXPERIMENTAL ANIMALS:

The crabs were collected and brought to the laboratory from the local paddy fields and were kept in large glass aquaria partially immersed in freshwater (tap water). They were exposed to the natural photoperiod. The water temperature was 30$^\circ$ C ± 1$^\circ$ C in summer. They were fed with earthworms and frog muscles. Water in the aquaria was replaced daily with freshwater. The crabs were maintained
thus for at least one week to obviate the effects of environmental changes. During this period about 50% of the crabs do not survive. Once they survive the effects of change from the field conditions to laboratory conditions, generally there will be no further casualties. Crabs selected for experiments were generally of the size range 15 to 20 gms. Both the sexes were used in equal number to avoid the influence of sex. Injured crabs were avoided and gravid or egg carrying females were not used. Experiments are conducted in static water as suggested by Deuderooff et al., (1951).

FACTORS INFLUENCING PESTICIDE TOXICITY:

Factors like flow of water, temperature, salinity, pH, hardness of water etc., which are likely to contribute variations in toxicity were nullified to a satisfactory level (Sullivan, 1977; Lehnberg and Theeds, 1979; Chakoumakos et al., 1979; Parvathi, 1982). The crabs were starved for 24 hrs prior to each estimation so as to eliminate the possibility of any dietary influence. As detritification and metabolism of xenobiotics in fishes is influenced by holding in captivity (Dewaide, 1972) greater care was taken in maintenance and the crabs were handled very gently and carefully.