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OBSERVATIONS ON THE HOST PREFERENCES OF *CLETUS BIPUNCTATUS* WESTE. (HETEROPTERA: COREIDAE) ON SOME AMARANTACEOUS HOST PLANTS

S. S. CHANDRASEKAR
Entomology Research Institute, Loyola College, Madras 600 034, India.

BIOLOGICAL aspects of coreids feeding on Amarantaceous plants are not on record, but *Cletus bipunctatus* Weste. has been observed feeding and breeding on the immature seeds and flowers of *Amarantus spinosus* Linn., *Amarantus viridis* Linn. and *Gomphrena decumbens* Facq.

Adult of *C. bipunctatus* was seen to mate 5–7 days after emergence, the pairs remaining in copula for a period of 2–3 hr and repeated mating occurred before oviposition. The preoviposition period was 3–5 days and the eggs were laid singly on the inflorescence as well as on the adaxial and abaxial surface of the leaves. Each female laid about 83–117 eggs during its average life time of 31 days.

The time taken for the development of immature stages varied with the host plants. It was 21.19, 22.48 and 23.96 days and fecundity 117, 102 and 83 when *C. bipunctatus* fed on *G. decumbens*, *A. spinosus* and *A. viridis* respectively (table 1).

Growth studies of *C. bipunctatus* on the three host plants were made using Huxley's[1] formula, $Y = bx^k$, where 'Y' represents the total length of the body, 'x' the length of the body parts, 'b' the initial growth index and 'k' the growth ratio. With all the three host plants, the growth pattern of different organs conformed to the simple law of allometry and the growth ratios were greater for the females than for the males. The growth rate in terms of the total body length of the adult revealed a maximum body length for individuals that fed on *G. decumbens* followed by *A. spinosus* and *A. viridis*.

Variation in the growth and reproductive rates on different host plants appears to be due to physiological conditions of the host plant which provide food of variable nutritional quality. Therefore host plant preferences in terms of biochemical parameters were studied with particular reference to protein[2], carbohydrate[3], phenol[4], and nitrogen[5] contents of the inflorescence of the three host plants. The importance of organic nitrogen[6], sugars and proteins[7], and phenol[8] in host plant selection by phytophagous insects is very well known. Biochemical analysis revealed maximum nitrogen, carbohydrate and phenols in *A. viridis* followed by *A. spinosus* and *G. decumbens* (table 1). Van Emden[9] stated that increased nitrogen content increased the fecundity and survival of aphids. Post-embryonic studies indicated that the growth rate and fecundity were greater when reared on *G. decumbens* than on *A. spinosus* and *A. viridis*. Even though *A. viridis* contained a greater amount of proteins and nitrogen, the fecundity and growth rate were low due to high amounts of sugars and phenols. Therefore, the preference of *C. bipunctatus* to *G. decumbens* may be presumed to be due to low levels of sugars and phenols, even though it had lesser amounts of nitrogen and proteins.

The author wishes to express his deep sense of

Table 1 *Duration of development, fecundity of Cletus bipunctatus and chemical analysis of host plants*

Host plant	Duration of development in days	Fecundity	Proteins (mg/g)	Phenol (mg/g)	Carbohydrate (mg/g)	Nitrogen (%)	Carbohydrate/ Protein ratio
Amarantus viridis	23.96	83	52 46	212.26	916.26	5.75	17 47
Amarantus spinosus	22.48	102	44.16	160.00	895.67	3.25	20.29
Gomphrena decumbens	21.19	117	42.33	141.67	816 67	1.75	19 29

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SIGNIFICANCE OF AMINOTRANSFERASE ACTIVITY OF THE FRESHWATER TELEOST, *OREOCHROMIS MOSSAMBICUS* (TREWAVAS) UNDER LINDANE TOXICITY

B. NARASIMHA MURTHY, M. SRINIVASULU REDDY and K. V. RAMANA RAO
Department of Zoology, S.V.U.P.G. Centre, Kavali 524 202, India.

THE indiscriminate and excess use of organochlorine insecticides are known to cause serious effects on non-target animals[1-3]. Lindane is an organochlorine insecticide and is expected to show similar behaviour. But its effect on metabolic and physiological alterations particularly on fish enzyme systems needs elucidation. The aspartate (AAT) and alanine (AlAT) aminotransferases are known to play a strategic role in mobilising L-amino acids for gluconeogenesis and also function as links between carbohydrate and protein metabolisms under altered physiological, pathological and induced environmental stress conditions[4-6].

Because of this unique property, AAT and AlAT enzyme systems were determined in metabolically and functionally active tissues of lindane exposed fish, *Oreochromis mossambicus*, as a function of time.

Healthy, living specimens of *O. mossambicus* were collected from local freshwater tanks. Before experimentation, the fish were allowed to acclimate to laboratory conditions for a week. The test water characteristics were, temperature, $20 \pm 3°C$; pH, 7.2; hardness, 160 ppm (as $CaCO_3$); alkalinity, 87 ppm (as $CaCO_3$) and dissolved oxygen, 7.5 ppm. Preliminary toxicity tests[7] showed that LC 50 of lindane to fish was 0.15 ppm[8].

Two hundred fish measuring 20 ± 3 cm in length and 8 ± 2 g in weight were selected, divided into six equal groups and exposed to lethal (LC 50 0.15 ppm) and sublethal (.0.05 ppm) concentrations of lindane for 12, 24 and 48 hr. After each exposure the fish were stunned by a blow on the head and the tissues like, brain, liver, muscle and gill were isolated and homogenized in 0.25 M sucrose solution. The homogenates were centrifuged at 1000 g for 20 min and the clear supernatants were used as the source of enzymes. The enzyme activity levels in the tissues were estimated by the method of Reitman and Frankel[9] after due standardization and the protein content determined by Lowry's method[10].

The tissue specific AlAT activity recorded maximum elevation at 48 hr of exposure in both concentrations of lindane and the trend is liver, brain, muscle, gill (table 1), while the AAT activity, though elevated at 48 hr exposure, show some variability at 12 and 24 hr of exposure (table 1). The lyotropic series of tissue specific AAT activity levels of fish exposed to both concentrations of lindane is as follows:

On lethal exposure: muscle > liver > gill > brain
On sublethal exposure: muscle > liver > brain > gill

AAT and AlAT enzymes increase in the four tissues at different levels in both concentrations of lindane indicating that the fish is under toxic stress and energy crisis caused by lindane thus promoting the utilization of amino acids for energy synthesis[4,11]. This suggests that the tissue glycogen might be insufficient to meet the lindane toxic stress and hence the operation of gluconeogenesis to mitigate the lindane toxic stress. Irrespective of the concentration, lindane can affect the tissues almost equally at 48 hr of exposure period.

The present results indicate that under lindane exposure, in both concentrations and at different time