Faculty of Science
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Biochemical and Ultrastructural Studies of Embryogenesis of The Desert Locust, *Schistocerca gregaria* (Forskal) Treated with a Selected Waste Product and a Chitin Synthesis Inhibitor

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ABSTRACT

The present studies were carried out in an attempt to determine the insecticidal activity of lufenuron (chitin synthesis inhibitors) and *Oryza sativa* bran extract (waste product) at different concentrations on the newly moulted 5th nymphal instar females of the desert locust, *Schistocerca gregaria* (Forskal) by feeding technique.

Some biological effects as failure of ecdysis to adults, adult mortality, prolongation in age of the 5th nymphs and different adult malformations were investigated after treatment, the effects increased significantly parallel to the ascending concentration level. Both treatments at LC_{50} showed inhibitory effects on the oviposition efficiency and other reproductive parameters.

Quantitative and qualitative determination of protein content in normal and affected eggs, which resulted from *S. gregaria* females were treated as one day old of the 5th nymphal instar with LC_{50} of lufenuron and *Oryza sativa* bran extract, during embryogenesis showed a significant decrease in the total proteins of affected eggs compared with the control at (0, 1 & 7) days post oviposition (pop) and (7 & 12) days (pop), respectively. While a significant increase was investigated in total protein at (4, 11 & 12) days (pop) and (0, 1 & 11) days (pop) for lufenuron and rice bran extract affected eggs, respectively compared with the control. Qualitative electrophoretic analysis in the present study exhibited many differences in protein patterns (mobility and number of bands) in affected eggs with lufenuron and rice bran extract treatment compared with the control group as the appearance of new bands and the absence of others. Also treatment caused significant differences in DNA content of

normal and affected eggs throughout embryogenesis (0 – 12) days (pop).

Histological and ultrastructural study of normal and affected eggs of *S. gregaria* were conducted to demonstrate the effects of lufenuron and rice bran extract on the embryogenesis. Cleavages started about 5 hrs (pop) and continue to divide until formation of cellular blastoderm by 1 day (pop). By 2 days (pop) germ band is formed, differentiated into ectoderm and mesoderm. At 3 days (pop) segmentation of germ band into mouth part and three thoracic segments occur. Antenna was observed at 3 days (pop). Fore and midgut were detected by 5 days pop. Hind gut was also observed by 5 days (pop). By 4 days (pop), eyes and brain appeared. Brain appeared as two ganglionic masses separated by oesophagus which by 5 days (pop) appears as 2 large interconnect cerebral lobes enwrapped by neurilemma. Histological section of affected eggs showed great effects on brain, alimentary canals and compound eyes.

Ultrastructural study of newly deposited eggs showed that, the chorion consists of several easily distinguishable layers and in 30 hours old eggs, cleavage nuclei of different shapes could be observed. The nuclei of the blastoderm cell have spindle shape and have condensed chromatin which attaches to nuclear membrane. Electron micrograph of lufenuron affected eggs revealed abnormal chorion and cleavage nuclei. In rice bran affected eggs, disintegrated blastoderm that failed to arranged and sever malformed nuclei were seen. Vaculation and lysis of cell components leaving cavities within the ooplasm were detected in both treatments.

Key words : *Schistocerca gregaria*; Lufenuron (chitin synthesis inhibitors); *Oryza sativa* bran extract (waste product); embryogenesis; histological study; ultrastructural study.

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