

ECOLOGY: OIL AND PESTICIDE POLLUTION

SEASONAL VARIATIONS OF TOTAL PETROLEUM HYDROCARBONS (TPH) IN WATER AND SEDIMENTS OF THE SHATT AL-ARAB RIVER, IRAQ

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ABSTRACT

The present study is concerned with seasonal variations in the distribution of petroleum hydrocarbons in water and sediments at six stations along the Shatt Al-Arab River: Al-Qurna, Al-Sindibad, Al-Ashar, Abu-Floos, Al-Sibah and Al-Fao. Samples were collected seasonally during the period from April 2004 (spring) to January 2005 (winter). Total concentrations of total petroleum hydrocarbons (TPH) dissolved in water ranged from 2.247 $\mu\text{g/l}$ in spring at Al-Qurna to 50.232 $\mu\text{g/l}$ in autumn at Al-Ashar. Concentrations of TPH as a particulate fraction ranged from 2.871 $\mu\text{g/g}$ in summer at Al-Qurna to 37.077 $\mu\text{g/g}$ in autumn at Al-Ashar. TPH concentrations in surface sediments ranged from 28.821 $\mu\text{g/g}$ in summer at Al-Sibah to 275.433 $\mu\text{g/g}$ in autumn at Al-Ashar, while in submerged bank sediments, both low and high concentrations occurred in autumn. The former concentration (38.155 $\mu\text{g/g}$) was found at Al-Qurna and the latter (380.516 $\mu\text{g/g}$) at Al-Ashar. Significant correlations were found between TPH and both content of chlorophyll (a) ($r = 0.848$) and lipids ($r = 0.835$).

HYDROCARBONS AND TRACE ELEMENTS IN WATER AND SEDIMENT FROM THE MARSHLANDS OF SOUTHERN IRAQ

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ABSTRACT

Levels of petroleum hydrocarbons and trace elements were determined in water and sediment samples from different locations in the marshlands of southern Iraq. The concentrations of total petroleum hydrocarbons (TPH) in these samples were determined using spectrofluorometry. The mean concentrations of TPH in water ranged from 0.012 ug/l in Al-Barkha to 0.37 ug/l at Al-Baghdadia 1, while in sediment samples the mean dry weight values ranged from 0.030 ug/g in Um-Alneach to 0.96 ug/g in Al-Baghdadia 2. Atomic absorption has been used to determine trace element levels. Distribution of trace elements in water and sediment showed spatial differences. Mean concentrations of trace elements in water were: Co (1.13-3.68), Mn (0.16-1.37), Ni (0.66-2.37), Fe (0.28-1.51) and Cu (0.10-0.28) mg/l. However, in sediment the mean concentrations were: Co (63.83-88.0), Mn (408.6-506.3), Ni (68.3-90.3), Fe (6923-9910) and Cu (16.63-38.30) ug/g dry weight. Grain size analysis with total organic carbon (TOC) was also determined. All the levels of both hydrocarbons and trace elements in water and sediment samples were low, indicating low pollution in these areas. Concentrations of pollutants found could be due to natural and anthropogenic sources. These concentrations are within the range of values reported for other comparable regional samples.

LEVELS OF PETROLEUM HYDROCARBONS IN DIFFERENT TISSUES OF THE FISH *Tenualosa ilisha* (Hamilton-Buchanan, 1822) FROM THE SHATT AL-ARAB RIVER AND IRAQI MARINE WATERS

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ABSTRACT

Levels of total petroleum hydrocarbons concentrations had been measured in different tissues of the fish *Tenualosa ilisha* from sites at Garmat Ali, Abo Al-Khsib, Fao, Al-Amique port and Khor Al-Zubair. The highest concentration of petroleum hydrocarbons in muscle tissues (35.72 µg/g), livers (54.26 µg/g) and gills (38.63 µg/g) occurred at Khor Al-Zubair, gonadal tissues (42.19 µg/g) at Al-Amique port, while the lowest concentrations in muscle tissues (12.21 µg/g), gonads (19.84 µg/g), livers (27.63 µg/g) and gills (18.49 µg/g) occurred at Garmat Ali. The results showed overall highest concentrations in Khor Al-Zubair and lowest in Garmat Ali. This confirms that the effects of oil pollution are probably due to industrial processes and transportation and waste of ships.

SHORT TERM TOXICITY OF THE INSECTICIDE DURSBAN TO THE FRESH WATER SNAIL *Lymnaea auricularia* (Linnaeus, 1758) FROM THE SHATT AL-ARAB RIVER, IRAQ

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ABSTRACT

A laboratory study was conducted to evaluate the toxicity of Dursban insecticide to the snail *Lymnaea auricularia* collected from the Shatt Al-Arab riverbanks. After collection, snails were put in a 20-liter tank containing filtered water from the Shatt Al-Arab River for accumulation. Ten snails, in triplicates, were exposed to Dursban insecticide in concentrations ranging from 0.00192 to 0.48 mg/l active material in addition to use of an untreated control tank. Monitoring was proceeded every 24 hours in which mortality of snails were registered numerically. Mortality appeared within 24 hours of exposure to concentrations 0.048, 0.144, and 0.48 mg/l. For the lowest concentration of Dursban, 0.00192 mg/l, mortality appeared after 96 hours of exposure, whereas for the control sample mortality appeared after 7 days. The maximum LT₅₀ values calculated for *L. auricularia* were 97.44 and 235.26 hours for the concentrations 0.00192 and 0.28 mg/l of dursban respectively, while the estimated LC₅₀ after 7 days of exposure was 0.0478 mg/l. The Biological Concentration Factor (BCF) was estimated to be 0.94 according to 0.2 % fat contents of *L. auricularia*.

**EFFECT OF EXPOSURE TO GASOIL ON THE SURVIVAL OF *Sesarma
boulengeri* Calman COLLECTED FROM INTERTIDAL ZONES OF THE SHATT
AL-ARAB RIVER**

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ABSTRACT

A laboratory experiment was conducted to evaluate the short term toxicity of gasoil on the survival rate of the aquatic crab *Sesarma boulengeri* residing in the intertidal zones on the banks of the Shatt Al-Arab River. Crabs were collected by hand and put in a tank of 20 l capacity containing filtered water from the Shatt Al-Arab River near the collection site. In the lab, crabs were classified into 1) juvenile males, 2) mature males, 3) juvenile females and 4) mature females. In separate containers, 10 crabs of each class in triplicate were put in each container and exposed during the summer season to different concentrations of gasoil (0.5, 2.5, 5, 7.5 and 10 ml/l) in addition to a control sample. The crabs were monitored every 24 hours and the mortalities were recorded numerically. The juvenile males showed the highest resistance to gasoil followed by juvenile females, then the mature males, and finally mature females showed the lowest resistance to gasoil. Moreover, the toxicity of gasoil increased with exposure time.

ALTERATIONS IN THE GLYCOGEN CONTENT OF *Cyprinus carpio* Linnaeus, 1758 AND *Carassius auratus* (Linnaeus, 1758) FISHES DURING ACUTE EXPOSURE TO MALATHION INSECTICIDE

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ABSTRACT

Cyprinus carpio and *Carassius auratus* fishes were exposed to acute concentrations (2, 4, 8 and 20 ppm) of malathion for 96 hours. Muscle glycogen in each fish was investigated. The concentration of muscle glycogen decreased to 0.56, 0.37, 0.25, 0.08 and 0.0125 ppm in *C. carpio* after exposure to 0, 2, 4, 8 and 20 ppm malathion insecticide, respectively. The same was found for *C. auratus* in which concentration of muscle glycogen decreased to 0.46, 0.175, 0.08, 0.04 and 0.02 ppm for the same trend of concentrations of malathion insecticide. *C. auratus* fish showed a significantly sharper decrease in the concentration of muscle glycogen compared to *C. carpio* ($P < 0.01$). Reduction in glycogen probably results from its rapid breakdown due to increased energy requirements of the fish or its utilization by anaerobic glycolysis.

**THE ROLE OF SOME AQUATIC PLANTS IN DECREASING THE RISK OF
PETROLEUM HYDROCARBONS IN THE SHATT AL-BASRA CANAL, SOUTH
OF HAMMAR MARSH**

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ABSTRACT

Two aquatic plants (common reed, *Phragmites* sp. Adans. and cattails, *Typha* spp. L.) were used to detect presence of petroleum hydrocarbon pollutants and determine their sources in the region of Shatt Al-Basra Canal, south of Hammar Marsh. The pollutant concentrations varied during the study and reached 28.06 µg/g dry wt. in March 2003 in the underground parts of common reed. After shutdown of the point source for a period of time, the concentrations decreased, thus indicating the source of pollutant discharge (Basrah oil refinery). The variance of pollutant concentration was due to the time of sampling and the amount of pollutant discharged to the environment. Data of the study showed the ability of the plants to retain some amount of the pollutants and to serve as an effective means of phytoremediation.