

Diagnosis of factors influencing *in vitro* oil toxicity assessment

H. AWAD

Faculty of Science, Department of Oceanography, Alexandria University, Moharram Bek, Alexandria (Egypt)

Crude oils as all purely organic pollutants in the marine environment (as well as during *in vitro* bioassay experiments) are naturally subjected to many quantitative and qualitative modifications. By consequence, test organisms should have variable responses depending upon the instance composition and concentration of oil in their media.

From methodological point of view, the characteristics of the followed method for preparing the oily working medium play an essential part in the magnitude of constitutional variation of oil during the bioassay duration. In fact, any slight variation in the preparative steps of oily working medium (ratio of oil to water, mixing mean, power or duration, etc...) leads to significant variation in the potential of applied initial oil concentration and composition. Unsufficient attention is paid for this primordial aspect in the MAP technical report, devoted for oil ecotoxicological research (UNEP/FAO, 1987).

The factors and variables influencing the evaluation of oil toxicity on the marine organisms could be divided into four groups : form of oil in test medium, test medium preparative steps, water quality and test organism characteristics. Among these groups of factors, the present work includes results concerning the effect of variations in oily test medium preparation steps on the applied oil concentration in the bioassay experiments. Also, the relationship between initial prepared oil concentration in test medium, toxic effect (fish mortality) and instantaneous oil concentration in the medium (measured at the time of bioassay when a certain toxic effect is observed) is discussed.

The materials of this work are two types of arabian crude oils (light and heavy), 3 chemical dispersants (Finasol-2, -5 and -7) and one species of fish (*Lebistes reticulatus*) as test organisms for *in vitro* bioassay experiments. Throughout series of tests for preparing oily test media, ratios of oil : water or oil : dispersant : water, mechanically shaking power and duration and stabilization time of the produced mixtures are systematically varied. For each test, dissolved and dispersed oil residues are measured (IOC/WMO, 1976). In another series of bioassay experiments (Fig. 1), in which dispersed oil is used, lethal effect is followed for 5 days in comparison with the initial and instantaneous oil concentration in the medium.

From one side, the results showed the significant primordial role of any slight variation in the characteristics of even one of the preparative steps of used oily medium in bioassay tests. From the other side, effect of oil is related more to its instantaneous concentration in the medium than to the initial applied one. These results are supporting the necessity of the need of a standard method for *in vitro* oil ecotoxicological studies. Without such method, a convincing and precise overall picture for the real oil pollution effects in the marine environment could never be attained (PATIN, 1982).

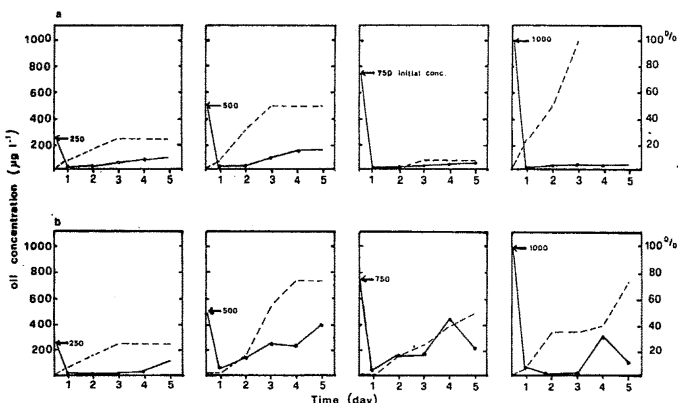


FIGURE 1 : Variations in fish-test mortality (---) in relation to variation in instantaneous dispersed light (a) and heavy arabian (b) oil concentration (- - -) with time using Finasol-7.

IOC/WMO, 1976. Guide to operational procedure for the IGOSS pilot project on marine pollution (petroleum) monitoring. UNESCO Manuals and Guides, n° 7.

PATIN S.A., 1982. Pollution and the biological resources of the oceans. Butterworth Scientific, London, 287 p.

UNEP/FAO, 1987. Research on the toxicity, persistence, bioaccumulation, carcinogenicity and mutagenicity of selected substances (Activity G). Final reports on projects dealing with toxicity (1983-85). MAP Technical Reports Series N° 10.

UNEP, Athens, 1987, 118 p.