

Development of Relevant Ecological Screening Criteria (RESC) for Petroleum Hydrocarbon-Contaminated Exploration and Production Sites

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Title: Development of Relevant Ecological Screening Criteria (RESC) for Petroleum Hydrocarbon-Contaminated Exploration and Production Sites

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Project Amount: \$117,463

Research Category: Ecorisk Assessment

Description:

Quarterly Progress Report (Jan-Mar 2001)

The major accomplishments of this quarter were:

- a. Completion of soil invertebrate toxicity tests with Enchytraeid worms (potworms)
- b. Commencement of plant toxicity tests with hydrocarbon-contaminated site soils
- c. Solid-phase microextraction analysis of hydrocarbon-contaminated soils

The *Enchytraeus albidus* bioassays have been completed and summarized (Figure 1 and 2). Toxicity tests with *Schizachyrium scoparium* (Little Bluestem), *Andropogon gerardii* (Big Bluestem), *Lactuca sativa* and *Brassica rapa* have commenced. Preliminary data is shown in Figure 3. A significant difference ($p < 0.0001$) was found between *Brassica rapa* plant stem heights of reference and contaminated soils, however, physical changes in the soil water holding capacity due to the presence of hydrocarbons may be the cause of this difference. The soils containing higher levels of petroleum hydrocarbon (2,118 – 13,243 mg/kg) have been observed to have reduced ‘wicking’ capacity, not allowing the soils to draw water up to the plant roots, and as a result, may reduce plant growth. Tests have been conducted according to the ASTM Standard Guide for Conducting Terrestrial Plant Toxicity Tests (1998).

Solid-phase microextraction (SPME) analysis of the bioavailable petroleum hydrocarbon in the soils is currently being conducted.

Plans for the current quarter include completion of the toxicity test with plant species, assembling existing data on the toxicity of hydrocarbons in soils, microbial assessment of soils, further chemical analysis of soils, especially to examine the reduced water-holding capacity in hydrocarbon-contaminated soils, and summary of the SPME analysis data.

Supplemental Keywords: hydrocarbon, soil, soil invertebrates, plants, soil screening levels, bioavailability, exposure assessment, toxicity tests

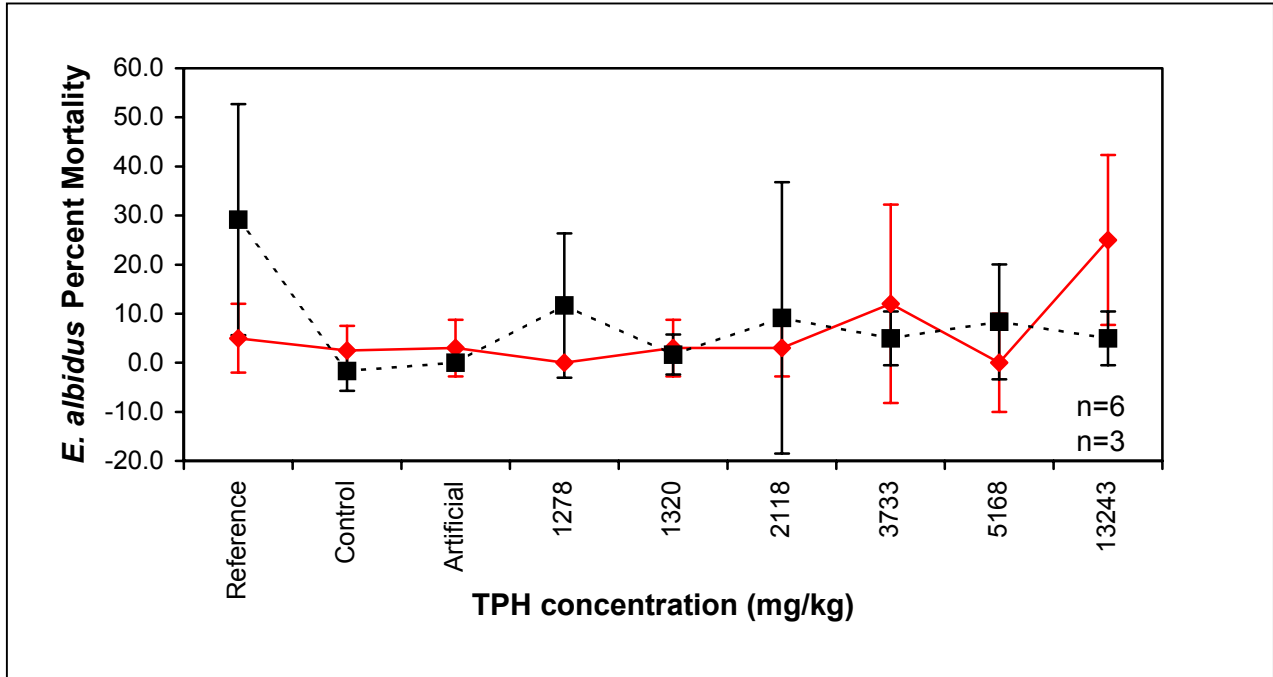


Figure 1. Points indicate *Enchytraeus albidus* average mortality from two tests conducted independently, \pm SD. No significant difference in mortality was found between the samples in both tests ($p > 0.05$).

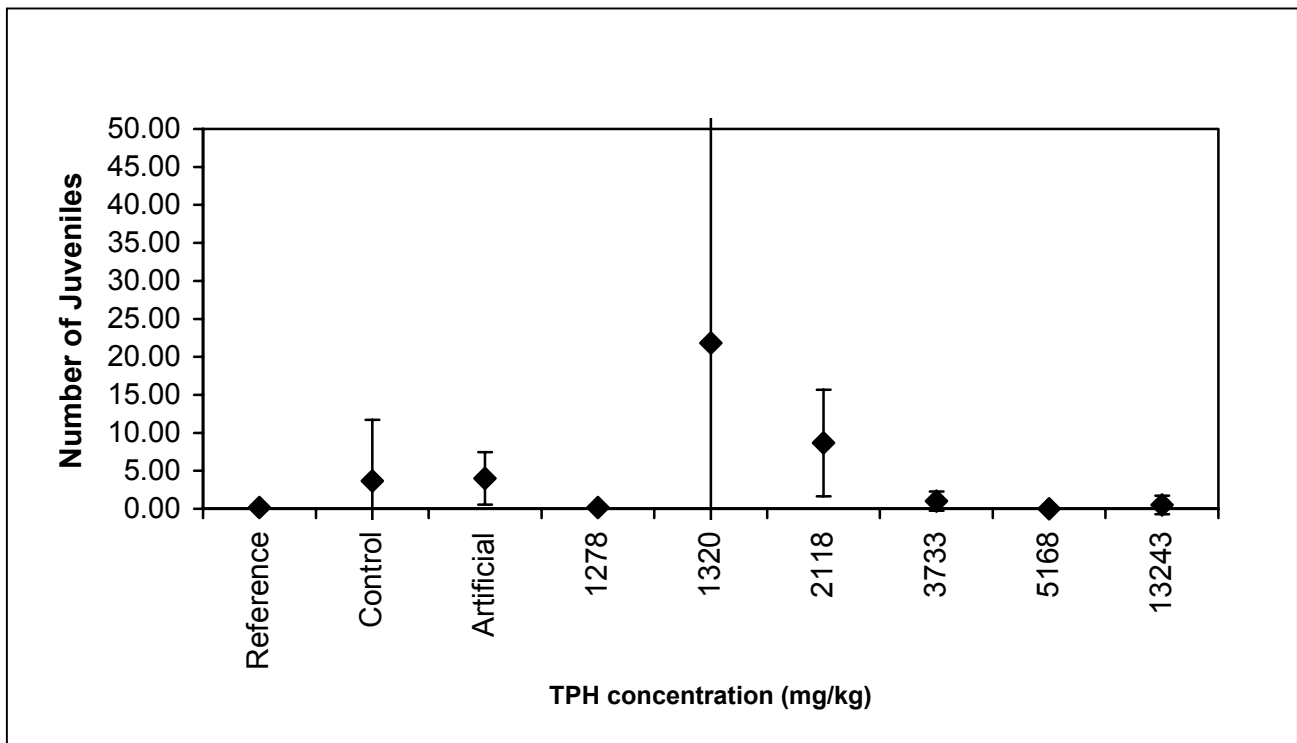


Figure 2. *Enchytraeus albidus* juvenile production, \pm SD.

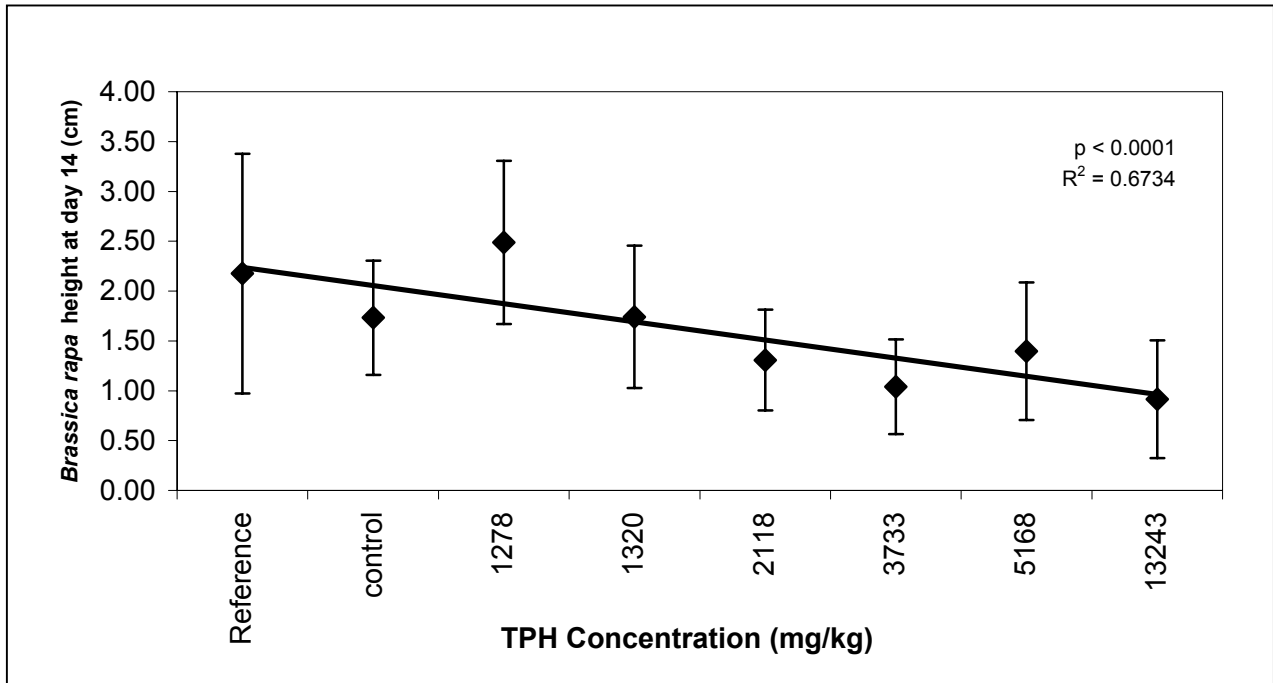


Figure 3. *Brassica rapa* stem height after 14 days of growth, \pm SD. A significant difference between reference soil and 2118, 3733, 5168, and 13243 mg/kg has been shown.