ABSTRACT

The sublethal toxicity of water-accommodated fractions of bunker oil was tested on the photosynthetic and respiration rates and chlorophyll a content of Kappaphycus sp. through a static non-renewal 120-h exposure test using 0 (control), 0.1, 1, 10, 100, and 1000 ppm oil concentrations. The bioconcentration factor of the seaweed in a test medium of 10 ppm bunker oil concentration after 24 h was also determined. Lower oil concentrations (0.1, 1 and 10 ppm) resulted to increased rates of photosynthesis after 24 h exposure, with the 1 ppm concentration having a significantly higher mean photosynthetic rate than the control (p=0.006). Respiration rates also increased after 24 h exposure with

an increase in oil concentration (p=0.016), the highest being in the 1000 ppm concentration 210.2% + 0.00 ppm-g″’ hr? (p=0.001) followed by the 100 ppm concentration at 0.23 + 0.00 ppm-g′ hr′ (p=0.043). Chlorophyll a content of the seaweed had an apparent direct relationship with oil concentration up to a certain level, however, the means were statistically insignificant (p=0.801). Bioconcentration factors at steady state of the seaweed did not show any trend with respect to exposure time and were not statistically significant from each other (p=0.228). No-observed-effect concentration (NOEC) and lowest-observed-effect concentration (LOEC) values were determined at 100 and 1000 ppm, respectively, while, the inhibition concentration resulting to 10% reduction in net photosynthetic rate (IC10), IC25, and IC50 after a 24-h exposure were estimated at 12, 61 and 834 ppm, respectively. These findings show that Kappaphycus sp. in the field can be resilient after an oil spill accident, especially after cleanup operations when the expected concentrations of oil in water would be low. Moreover, non-bioconcentration of the seaweed suggests that these are safe for human consumption even when farmed in waters with detectable oil content.

Keywords: sublethal toxicity, bioconcentration, WAF, bunker oil, Kappaphycus sp.