

# TESTING TOXICITY OF LEAD AND CADMIUM IN MICRO ALGAE *Chaetoceros gracilis*

Martiwi Diah Setiawati<sup>1</sup>, Dwi Hindarti<sup>2</sup>, and Richardus Kaswadji<sup>3</sup>

<sup>1</sup> Student of Fisheries and Marine Science Faculty, Bogor Agricultural University

<sup>2</sup> Research Center Oceanography Indonesian Institute of Sciences

<sup>3</sup> Fisheries and Marine Science Faculty, Bogor Agricultural University

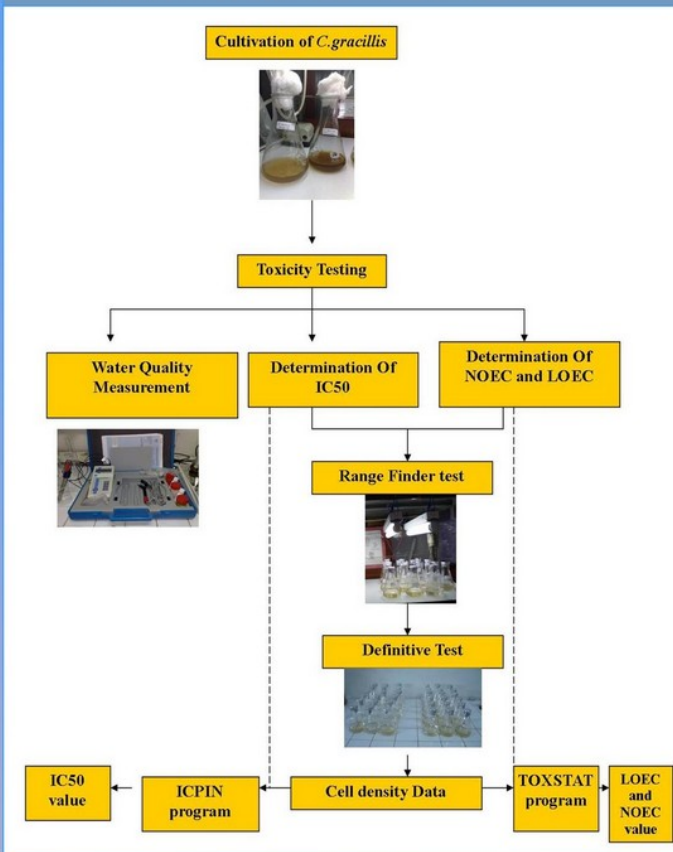
## Introduction

Increasing of industrial will increase the waste industry into the environment especially in the marine environment. One of waste industri which produced are heavy metals. Cadmium (Cd) and Lead (Pb) are two kinds of heavy metals that often used as the main material or additional material in industries. Cd and Pb was tested in microalgae *Chaetoceros gracillis*. Increasing concentration of lead and cadmium in the *Chaetoceros gracillis* will influence to metabolism processes by inhibiting cell growth. For that reason, the research was needed to estimate the concentration of lead and cadmium that influence to cell growth of *Chaetoceros gracillis* by using short-term bioassay as 96 hour.

The aim of the research are to estimate the value of IC50 (Inhibition Concentration), LOEC (Lowest Observed Effect Concentration), and NOEC (No Observed Effect Concentration) of lead and cadmium for 96 hour to cell growth of *Chaetoceros gracillis*.

## Method

The Research was conducted in February until May 2009 in Research Center Oceanography Indonesian Institute of Sciences Research Method based on Asean Canada CPMS II, 1995.



## Conclusion

- The effective concentration of lead and cadmium to reduce the *C. gracillis* growth cell as 50% for 96 h are 0.7 mgPb/l (IC50 0.7 mg/l) and 1.3 mgCd/l (IC50 1.3 mg/l).
- The lowest concentration of lead and cadmium which can reduce the *C. gracillis* growth cell are 0.26 mg Pb/l (LOEC 0.26 mg/l) and 0.56 mg Cd/l (LOEC 0.56 mg/l).
- The highest concentration of lead and cadmium which not significant to *C. gracillis* growth are less than 0.26 mg Pb/l (NOEC 0.26 mg/l) and 0.56 mg Cd/l (NOEC 0.56 mg/l)

## Result and Discussion

### 1. The Growth Pattern of *C. gracilis*

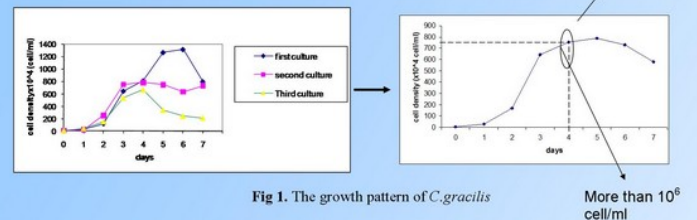


Fig 1. The growth pattern of *C. gracilis*

### 2. Water Quality Measurement

Table 1. Water Quality Test of cadmium to micro algae *Chaetoceros gracilis*

Nominal concentration (mg Cd/L)	Actual concentration (mg Cd/L)	pH	DO (mg/L)	Temperature (°C)	Salinity (‰)
control	0	8.13	6.21	24.1	34
0.56	0.56	8.14	6.3	24.2	34
1	0.92	8.15	6.32	24.2	34
1.8	1.7	8.19	6.3	24.2	34
3.2	3.2	8.15	6.31	24.1	34
5.6	4.9	8.17	6.37	24.2	34

Table 2. Water Quality Test of lead to micro algae *Chaetoceros gracilis*

Nominal concentration (mg Pb/L)	Actual concentration (mg Pb/L)	pH	DO (mg/L)	Temperature (°C)	Salinity (‰)
control	0	8.15	6.28	24.1	34
0.32	0.26	8.15	6.27	24.2	34
0.56	0.45	8.15	6.29	24.2	34
1	0.71	8.17	6.29	24.2	34
1.8	1.79	8.18	6.21	24.2	34
3.2	2.74	8.15	6.24	24.2	34

### 3. The Result of Definitive Test

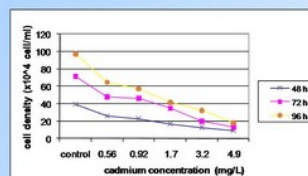


Fig 2. Graphic of cell density of *Chaetoceros gracilis* with variation of Cd concentration during 96 hour in definitive test

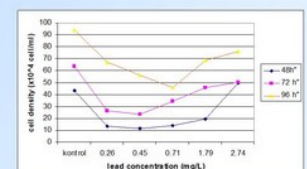


Fig 3. Graphic of cell density of *Chaetoceros gracilis* with variation of Pb concentration during 96 hour in range definitive test

Table 3. IC50, NOEC, and LOEC value in testing toxicity of lead and cadmium in *C. gracilis*

Toxicant	IC50	NOEC	LOEC
Cadmium (mg/l)	1.3	<0.56	0.56
Lead (mg/l)	0.7	<0.26	0.26

