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The Effect of Different Diet of Phytoplankton Cells on Growth Performance of Copepod, *Oithona* sp. in Semi-mass Culture

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Abstract

The effect of different diet of phytoplankton Cells on the growth performance of copepod, *Oithona* sp.in semi mass culture was examined in this research. This research used *Chaetoceros calcitrans*., *Chlorella vulgaris*., *Nannochloropsis oculata* and *Isochrysis galbana* as diet to known the *Oithona* sp. growth performance. This research was designed by using Completely Randomized Design (CRD) with four treatments and three replicates. Those treatments were **A.** the culture was added with *Chaetoceros calcitrans* cells diet, **B.** with *Chlorella vulgaris*.cells diet, **C.** with *Nannochloropsis oculata*. cells diet, and **D.** with *Isochrysis galbana*. cells diet, respectively. The results showed that the different diet of phytoplankton cells were highly significantly difference ($P < 0,01$) on *Oithona* sp. growth performance. The diet of *Chaetoceros calcitrans* cell gave the best performance of *Oithona* sp. growth, where reached (6.963 ± 0.38) ind · mL^{-1} of total density, (0.121 ± 0.003) ind · d^{-1} of specific growth rate, and eggs production of (16.50 ± 2.74) eggs · ind^{-1}.

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Keywords: Different diet; growth; *Oithona* sp.; phytoplankton cells; semi-mass culture

1. Introduction

As live food organism, *Oithona* sp. can be used as feed intermediate between rotifer and *Artemia*, or as a substitution of *Artemia*, but until recently it's existence has not been utilized optimally. Whereas Calcium content of *Oithona* sp higher than *Artemia* (Kusmiyati et al., 2000). The content of EPA and DHA is also higher than *Artemia*

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and rotifer. The high content of EPA/DHA will be helpful for growth improvement, the survival rate and reduce the occurrence of abnormality on shrimp larvae. *Oithona* sp. contain substances imunostimulant, attractant and some important digestive enzyme. Given the importance of *Oithona* sp. as a substitute for *Artemia* in the shrimp hatchery, hence the availability of *Oithona* sp. were sustainable was important.

Many research have done to show the effect of *Oithona* sp. compared with *Artemia* dan rotifer (*Brachionus* sp.) for marine fish fry. Many of them showed the increasing of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) composition on *Cromileptes altivelis* (Valenciennes, 1828) (Aliah et al., 2010), survival rate on *Hippocampus kuda* (Bleeker, 1852) (Redjeki, 2007), growth on *Chanos chanos* (Forsskål, 1775) [Raj et al., 2003] and growth and survival rate of *Lates calcalifer* (Santhanam and Perumal, 2012). There were still little information to increase *Oithona* sp. culture for aquaculture activity. According to Santhanam and Perumal (2012) and Vasudevan et al. (2013) there were still no ideal phytoplankton diets to culture *Oithona* sp. in semi-mass condition.

The phytoplankton *Chaetoceros calcitrans* (Ehrenberg, 1844) , *Chlorella vulgaris* Beyerinck (Beijerinck, 1890), *Nannochloropsis oculata* (Droop) (Hibberd, 1981) and *Isochrysis galbana* (Parker, 1949) were choosed for the feed to *Oithona* sp. culture in semi-mass condition. Many of them already well developed on mass culture, generally available on marine hatchery, and already used in *Oithona* sp. culture as mixed phytoplankton (Molejo'n and Alvarez, 2003; Santhanam and Perumal, 2012a; Zamora et al., 2014). The different phytoplankton was expected to give an effect for *Oithona* sp. growth performance. The most suitable single cell phytoplankton will show the best *Oithona* sp. growth performance (Kleppel, 1993). The purpose of this research was to know the effect of different diet of phytoplankton on growth performance of *Oithona* sp. and the kind of phytoplankton that give the best growth performance of *Oithona* sp.

2. Material and methods

This research conducted at BBPBAP - Laboratory of Brackish Water Aquaculture Development Research Center (BWADRC), Jepara, Central Java, Indonesia in 2015 by using Completely Random Design (CRD) with four treatments by using Completely Random Design (CRD) with four treatments. That treatment were : A. culture *Oithona* sp. by using phytoplankton, *C. calcitrans* ; B. culture *Oithona* sp. by using phytoplankton, *C. vulgaris*; C. culture *Oithona* sp. by using phytoplankton, *N. oculata* ; and D. culture *Oithona* sp. by using phytoplankton, *I. galbana*. Dry weight was used as the base in the calculation of the number of cells used in each treatment. The dry weight of each individual algae was 11.3 pg · cell^{-1} to *C. calcitrans* [Lavens and Sorgeloos, 1996], 12 pg · cell^{-1} to C. *vulgaris* [Lee *et al*., 2006], 6.1 pg · cell^{-1} to *N. oculata* and 25 pg · cell^{-1} to *I. galbana* [Lee et al., 2006].

2.1. Phytoplankton culture

C. calcitrans, *C. vulgaris*, *N. oculata* and *I. galbana* were got from Life Food Laboratory, BBPBAP Jepara. These phytoplankton were cultivated in that laboratory on Modificated Walne Medium, using filtered sea water sterilized by boiled. The cultures was incubated at 25 ºC to 28 ºC temperature, 24 ‰ to 34 ‰ salinity, pH 8 to pH 9, with a 24 h light photoperiod and at 1 500 lx to 1 800 lx .

Phytoplankton cultured in sterile erlenmeyer flask volume 6 L. Seawater sterilized through a membrane filter then accommodated in drum-sized 50 L. Sea water was then added with a solution of Natrium Hypochlorite (NaCIO) 60 mg · L^{-1} for 10 min to 30 min. The declorination process then performed through the addition of NatriumTiosulfate solutions (NaS_2O_3) 80 mg · L^{-1} accompanied by aeration for 24 h. Declorination process results then filtered by planktonet 5 µm and autoclaved (1 atm, 121 ºF [1 atm = 101 325 Pa]) before it was ready to use. Phytoplankton culture used Modification Walne Medium with a dose of 0.5 mL for every 1 L sea water.

There was a difference between main chemical concentration Modification Walne Medium for culture of *C. vulgaris* and *N. oculata*, and Modification Walne Medium for culture *I. galbana* and *C. calcitrans*. The main concentration of chemical Modification Walne Medium for culture of *C. vulgaris* and *N. ouculata* used NH_4NO_3. Instead, culture of *I. galbana* and *C. calcitrans* used NaNO3. Vitamin B_{12} with dosage of 0.5 mL to 1 L sea water was added in all cultures microalgae. Silicate (Na_2SIO_3) with the same dosage also added to the culture of *I. galbana* and *C. calcitrans.*

Volume of inoculan phytoplankton was 10 % of the volume of media culture Lee et al. (1996). Harvesting algae