

**PEMANFAATAN LIMBAH BUDIDAYA IKAN
HASIL OLAHAN SECARA MIKROBIOLOGIS
UNTUK MEDIA KULTIVASI *Nannochloropsis oculata*
SEBAGAI UPAYA PENCEGAHAN PENCEMARAN
PERAIRAN PESISIR**

**Reagan Septory
12/340934/PMU/06727**

**Program Studi Ilmu Lingkungan, Sekolah Pascasarjana,
Universitas Gadjah Mada**

INTISARI

Akumulasi limbah bahan organik dan anorganik yang berasal dari budidaya ikan dapat menyebabkan penyuburan (*eutrofikasi*) perairan yang dapat memicu terjadinya pertumbuhan alga secara berlebihan (*blooming algae*) sehingga berdampak negatif terhadap ekosistem perairan. Penelitian ini bertujuan untuk mengetahui karakteristik fisikawi, kimiawi dan biologis limbah budidaya ikan pada kondisi pemberian aerasi dan tanpa aerasi, dan untuk mengetahui kandungan nutrisi dalam limbah budidaya ikan yang dapat digunakan untuk kultivasi mikroalga *Nannochloropsis oculata*.

Dekomposisi limbah terjadi secara biologis dalam reaktor pada kondisi pemberian aerasi dan tanpa pemberian aerasi selama 14 hari. Selama pengujian limbah dilakukan pengamatan terhadap suhu, pH, BOD₅ dan O₂ terlarut. Senyawa NH₃-N, NO₂-N, NO₃-N dan PO₄³⁻ air limbah dianalisa secara spektrofotometri. Densitas *N. oculata* yang dikultivasi pada skala laboratorium dihitung dengan metode *direct count* sedangkan penentuan densitas total bakteri menggunakan metode *Heterotrophic Plate Count* (HPC).

Hasil penelitian menunjukkan bahwa perubahan amoniak, nitrat dan nitrit pada perlakuan pemberian aerasi lebih cepat terjadi dibandingkan perlakuan tanpa aerasi. Fosfat pada kedua perlakuan menunjukkan peningkatan konsentrasi secara gradual dengan pola yang relatif sama. Konsentrasi fosfat tertinggi mencapai 0,9 mg/L pada kedua perlakuan. Kepadatan *N. oculata* dapat mencapai kepadatan tertinggi sebesar 19,75 x 10⁶ sel/mL. Setelah kultivasi *N. oculata* konsentrasi amonia, nitrit, nitrat dan fosfat menjadi sangat rendah. Pemanfaatan limbah sebagai media kultivasi *N. oculata* dapat mendukung ketersediaan pakan alami dalam kegiatan budidaya ikan dan sekaligus pencegahan pencemaran perairan pesisir.

Kata kunci: limbah budidaya ikan, *Nannochloropsis oculata*, dekomposisi limbah

**THE UTILIZATION OF AQUACULTURES WASTEWATER AS
NUTRIENT SOURCES IN *Nannochloropsis oculata* CULTIVATION TO
PREVENT WATERS CONTAMINATION IN COASTAL AREA**

Reagan Septory
12/340934/PMU/06727

**Environmental Sciences Study Program,
Gadjah Mada University Graduate School**

ABSTRACT

Accumulation of organic and inorganic matter which be produced by aquaculture activities can lead waters eutrophication resulting in algae blooming. However, the dissolved nutrient contained in the wastewater can support *Nannochloropsis oculata* growth that promote wastewater purification. The objectives of this study were to investigate the chemical, physical and biological of wastewater condition through aeration and non-aeration treatment and nutrient available for *N.oculata* cultivation.

Wastewater biological decomposition were tested for 14 days in both aeration and non-aeration treatment. Temperature, pH, BOD₅ and dissolved compound were monitored during wastewater treatmet. The concentration of ammonia, nitrite, nitrate and phosphate change were determined spectrophotometrically during wastewater treatment and after *N. oculata* cultivation. Both *N. oculata* density and total bacteria were enumerated by direct count method and heterotrophic plate count (HPC) method respectively. The successful utilization of nutrients from wastewater by *N.oculata* was signed by its cell density and chlorophyll-a content.

The decomposition of ammonia, nitrate and nitrite in aeration treatment were faster compared to non-aeration treatment. The rate of phosphate concentration enhance gradually and has similar pattern for both aeration and non-aeration treatment . The phosphate concentration of wastewater for both aeration and non-aeration could reach 0,9 mg/L at the end of treatment. *Nannochloropsis oculata* was able to utilize nutrient to construct it cell structure. The highest density of *N. oculata* as long as cultivation could reach 19.75×10^6 cell mL⁻¹. After cultivation of *N. oculata*, concentration of ammonia, nitrite, nitrate and phosphate in wastewater were extremely low. This result suggest that utilization of nutrients from aquaculture in *N. oculata* cultivation were possible to support aquaculture activities and at the same time to prevent coastal waters contamination.

Keywords: aquaculture waste, *Nannochloropsis oculata*, waste decomposition