

INTISARI

PENINGKATAN DAYA DUKUNG BUDIDAYA NILA MERAH (*Oreochromis sp.*) MENGGUNAKAN TEKNOLOGI MICROBUBBLE DALAM SISTEM RESIRKULASI

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Penelitian ini bertujuan untuk mengetahui pengaruh aerasi *microbubble* terhadap peningkatan oksigen terlarut, daya dukung budidaya, pertumbuhan, status kesehatan dan respon imun budidaya nila merah. Penelitian terbagi dalam tiga tahapan. Pada penelitian kesatu menguji performa jenis alat aerasi, tahap kedua menguji pengaruh aerasi *microbubble* dibandingkan blower dalam meningkatkan oksigen terlarut, daya dukung, pertumbuhan, kesehatan dan ketahanan imun ikan terhadap adanya stresor, tahap ketiga menguji aerator *microbubble* terhadap pertumbuhan, kesehatan dan ketahanan imun nila merah pada padat penebaran berbeda. Peralatan yang digunakan adalah satu set wadah sistem resirkulasi, aerator *microbubble* tipe *orifice and porous pipe* dengan satu unit *nozzle*, aerator blower, *gasflow meter* dan *water quality checker* untuk mengukur kualitas air harian. Parameter CO₂, alkalinitas dan BOD diukur secara tetrimetri, sedangkan amonia, nitrit dan nitrat diuji dengan metode spektrofotometri (SNI 06-6989.30-2006, SNI 06-6989.9-2004 dan APHA 2017, Section 4500-NO₃B). Hemoglobin, hematokrit dan glukosa diukur menggunakan alat pengukur digital analisa otomatis, sel darah putih menggunakan larutan turk, total sel darah merah menggunakan larutan hayem, total protein plasma menggunakan larutan bradford *protein test kit* dan kortisol diukur dengan enzim immunoassay (Cortisol ELISA). Hasil penelitian kesatu menunjukkan bahwa aerasi *microbubble* meningkatkan oksigen terlarut sebesar 12% lebih tinggi dibandingkan aerasi blower. Daya dukung pada aerator *microbubble* meningkat 17% dari aerasi blower. Hasil penelitian kedua pada pemeliharaan nila merah menunjukkan bahwa oksigen terlarut oleh aerator *microbubble* >4 mg L⁻¹, sedangkan pada aerasi blower <2 mg L⁻¹. Biomassa nila merah dalam aerasi *microbubble* 38% lebih tinggi dengan status kesehatan dan respon imun yang lebih baik daripada nila merah pada perlakuan aerasi blower. Pada penelitian ketiga, peningkatan pertumbuhan pada kepadatan 50, 63, 75 dan 88 ekor 0,8 m⁻³ mengalami pertumbuhan masing-masing sebesar 80,50%; 60,65%; 60,19%; 44,61%, dengan kesehatan ikan pada semua perlakuan padat penebaran tidak berbeda, sementara kadar glukosa serta kortisol meningkat dengan meningkatnya padat penebaran namun tidak berbeda nyata. Kesimpulan penelitian ini yaitu aerasi *microbubble* dapat meningkatkan daya dukung budidaya, kualitas air, pertumbuhan, kesehatan dan imunitas nila merah.

Kata kunci: hematologi, imunitas, pertumbuhan, stres, transfer oksigen

ABSTRACT

CARRYING CAPACITY IMPROVEMENT OF RED TILAPIA (*Oreochromis sp.*) CULTURE USING MICROBUBBLE TECHNOLOGY IN A RECIRCULATING SYSTEM

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This study aimed to determine the effect of microbubble aeration on increasing dissolved oxygen, carrying capacity, growth, health status and immune response of red tilapia culture. The research was divided into three phases. The first study tested the performance of types of aeration devices, the second study examined the effect of microbubble aeration compared to blowers in increasing dissolved oxygen, growth, fish health and fish resistance to stressors, the third study tested the effect of microbubble aerators on growth and health of red tilapia at different stocking densities. The equipment consisted of a set of recirculation system tanks, orifice and porous pipe microbubble aerators with a nozzle unit, aerator blowers, a gas flow meter and a water quality checker to measure daily water quality. The parameters of CO₂, alkalinity and BOD were measured titrimetrically while ammonia, nitrite, and nitrate were tested by spectrophotometry method (SNI 06-6989.30-2006; SNI 06-6989.9-2004; APHA 2017, Section 4500-NO3B). Hemoglobin, hematocrit and glucose were measured with an automated digital device, white blood cells by Turk's solution, total red blood cells by Hayem's solution, total plasma protein by a Bradford protein test kit solution and cortisol by enzyme immunoassay (Cortisol ELISA). The results of the first study showed that microbubble aeration increased dissolved oxygen by 12% higher than blower aeration. The carrying capacity of the microbubble aerator is increased by 17% compared to the blower aeration. The second study showed that the dissolved oxygen by the microbubble aerator was $>4 \text{ mg L}^{-1}$, while the blower aeration was $<2 \text{ mg L}^{-1}$. Red tilapia biomass in microbubble aeration was 38% higher with better health status and immune response than red tilapia in blower aeration treatment. In the third study, the increase in growth at densities of 50, 63, 75, and 88 fish in a $0,8 \text{ m}^3$ water tank was 80,50%; 60,65%; 60,19% and 44,61%, fish health in all treatments of stocking density was relatively indistinguishable while glucose and cortisol levels increased as increasing stocking density but were not significantly different. The conclusion of this study was that the microbubble aeration increased the dissolved oxygen, carrying capacity, growth, health and immunity of red tilapia culture.

Keywords: *hematology, immunity, growth, stress, oxygen transfer*