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1 message

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To: International Conference on Fisheries and Marine Sciences Universitas Airlangga <incofims@fpk.unair.ac.id>

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Dr. Akhmad Taufiq Mukti
Assoc. Prof. Genetics and Reproduction of Aquatic Organisms
(Aquaculture Biotechnology)
Department of Aquaculture
Faculty of Fisheries and Marine
Universitas Airlangga
Kampus C Unair, Jl. Mulyorejo, Surabaya 60115
Telp. +62 31 5911451
Fax. +62 31 5965741
HP. +62 81555637985 / +62 81358496570

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Morressier Team <discover@morressier.com> Fri, May 20, 2022 at 9:28 PM
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Dear A T Mukti,

We are pleased to inform you that the following Papers have passed the Publisher’s checks and are being finalized for publication:

- Monitoring the occurrence of Zoea Syndrome (ZS) in pacific white shrimp (Litopenaeus vannamei) larval from several hatcheries in East Java, Indonesia
- The Effect of Laserpuncture on Accelerate Gonadal Maturity of Female Striped Catfish (Pangasianodon hypophthalmus)
- The dominance and proportions of plankton in Pacific white shrimp (Litopenaeus vannamei) ponds cultivated with the intensive system in Bulukumba Regency, South Sulawesi, Indonesia
- Mass tilapia (Oreochromis mossambicus) mortality in floating net cages at Batur Lake, Bangli Regency, Bali Province: a case report

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To: Morressier Team <discover@morressier.com>

Dear
IOP Team

Thanks for the information.
Please reject the title "The Effect of Laserpuncture on Accelerate Gonadal Maturity of Female Striped Catfish (*Pangasianodon hypophthalmus*)", because we have never submitted the paper for publication. Thank you very much.

Best regards,

Akhmad Taufiq Mukti

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Dr. Akhmad Taufiq Mukti
Assoc. Prof. Genetics and Reproduction of Aquatic Organisms
(Aquaculture Biotechnology)
Department of Aquaculture
Faculty of Fisheries and Marine
Universitas Airlangga
Kampus C Unair, Jl. Mulyorejo, Surabaya 60115
Telp. +62 31 5911451
Fax. +62 31 5965741
HP. +62 81555637985 / +62 81358496570

The d~~D~~ominance and p~~P~~roportions of p~~P~~lankton in Pacific White Shrimp *(Litopenaeus vannamei)* p~~P~~onds c~~C~~ultivated with i~~I~~ntensive s~~S~~ystem in Bulukumba Regency, Indonesia

M D Sani[1] , P A Wiradana[2] , A Y Maharani[1] , R E Mawli[1] , and A T Mukti[3,4]

[1]Department of Biology, Faculty of Science and Technology, Universitas Airlangga, Kampus C Jalan Mulyorejo, Surabaya (60115), East Java, Indonesia

[2]Study Program of Biology, Faculty of Health, Science, and Technology, Universitas Dhyana Pura, Jalan Raya Padangluwih, Badung Regency, Bali (80351), Indonesia

[3]Department of Aquaculture, Faculty of Fisheries and Marine, Universitas Airlangga, Surabaya 60115 Indonesia

[4]Corresponding author: akhmad-t-m@fpk.unair.ac.id

Abstract. This study aimed to monitor plankton in Pacific white shrimp *(Litopenaeus vannamei)* cultivation in Bulukumba Regency, South Sulawesi. Study was conducted in six intensive ponds for 84 days from November 2019 to February 2020. Plankton samples were collected every 10 days for 8 weeks based on age/day of culture (DOC) of pacific white shrimp since the first distribution in the pond using plankton net (mesh size: 25 µm) and preserved in 250 mL of sterile plastic to 5% formalin buffer that was previously added, then the density and composition of the plankton were analyzed quantitatively and qualitatively. The results showed that plankton dominance in Chlorophyta species and the presence was evenly distributed across all shrimp ponds in the field and the number was relatively stable in all shrimp DOCs and was the highest proportion as well; Chlorophyta (73-83%), Diatom group (7.75-5.63%), and Blue-Green Algae (BGA) group (7.13-13.50%). Plankton can be used as a biomonitor of pollution and shrimp health in dominance and the percentage proportion of each species. Regular monitoring is highly recommended to minimize plankton growth, especially the BGA type that has the potential to cause a negative impact on shrimp health in the intensive system.

1. Introduction

Shrimp production has increased by 6.09 million tonnes with the value of USD 36.2 million. It indicates the higher shrimp consumption worldwide in 2015 [1]. The cultivation of pacific white shrimp or *Litopenaeus vannamei* is of the most cultivated aquaculture commodity globally, reaching up to 90% [2]. Indonesia is one of the countries in Southeast Asia with excellent potential for pacific white shrimp cultivation and can contribute in increasing foreign exchange through the aquaculture sector [3].

Plankton (Phyto- and zooplankton) is microscopic organism living in water. The existence of plankton has an important role in maintaining the food chain stability in aquatic ecosystems [4]. Phytoplankton has a role as the main producer of changing solar energy into chemical energy and nutrient producers in water cycle. Meanwhile, zooplankton transmits this energy to a higher trophic level as a link between energy producers and consumers [5,6]. However, plankton communities can continuously change temporally and spatially. It actually encourages a study to explain the effect of these changes on water quality in aquatic ecosystems [7]. The dynamics of phytoplankton community change is often associated with the bottom-up effect of environmental variables such as temperature [8], light and nutrients, [9] and phytoplankton-zooplankton interactions [10].

Monitoring the activities of the dynamics of the plankton community is necessary in supporting the success of the intensive system of pacific white shrimp cultivation [11–13]. The application of this system in shrimp farming with severe effects on the environment, shrimp, and farmers. Several reports state that the application of intensive shrimp farming systems can lead the degradation of wetlands, local water pollution, water salination problems, accumulation of anoxic sediments, changes in benthic communities, and water eutrophication [14]. In terms of shrimp health, the application of an intensive system may reduce the immunity system of shrimp due to the high stocking density [15], an increase in infectious diseases such as bacteria [16], [17], fungi [14], viral [18], [19], and parasitic [20],ammonia from leftover feed that may affect shrimp physiology [21].

Monitoring of biotic factors such as plankton (phyto- and zooplankton) in intensive system of shrimp ponds helps to understand environmental factors that control shrimp health to maximize shrimp productivity [22]. It is important because plankton can be the bioindicator for environmental health in aquaculture. For example, the presence of microalgae such as diatoms in shrimp ponds is temporary and can eventually be replaced by cyanobacteria due to an increase in the concentration of nutrients in the pond which is actually beneficial for cyanobacteria. In addition, decrease in water quality parameters such as dissolved oxygen (DO) can also be caused by microalgae, a condition which could affect shrimp growth and physiology. To avoid the occurrence of this microalgae bloom, monitoring activities must be carried out regularly [23].

This study aimed to monitor plankton as biological factors based on the dominance and percentage proportion of plankton in Pacific white shrimp farmed using the intensive system in Bulukumba Regency, South Sulawesi. This study was conducted to provide information on biological factors for guidance in maintaining plankton stability in shrimp ponds to increase productivity.

2. Materials and methods

2.1. Study area

The research was conducted in intensive ponds for 84 days from November 2019 until February 2020 in Bulukumba Regency, South Sulawesi, Indonesia (See Figure 1). A total of six (6) shrimp ponds with intensive systems were used as research objects with pond sizes ranging from 2,900 - 4,000 m^2 and stocking density of pacific white shrimp averaging 208 fries / m [17]. Samples were taken every 10 days for 8 weeks based on day of culture (DOC) of pacific white shrimp since the first time spread in the pond. Plankton was collected on the surface of the pond water using a plankton net (mesh size: 25 μm) and preserved in 250 mL of sterile plastic to 5% buffered formalin was previously added [24].

2.2. Sampling Procedure

The dominance and proportion of plankton were analyzed quantitatively and qualitatively using a microscope (Olympus CX23) at total magnifications of 100× and 400×. Pond water samples were dripped on a Neubauer hemocytometer and calculated using the cell counting method, the number of each type of plankton that had been observed on one grid multiplied by 10^4 cells / mL [25]. The plankton obtained was identified referring to the book titled *Phytoplankton Identification*, *Marine Phytoplankton Atlas of Kuwait's Waters*, and *Identifying Marine Phytoplankton* [26].

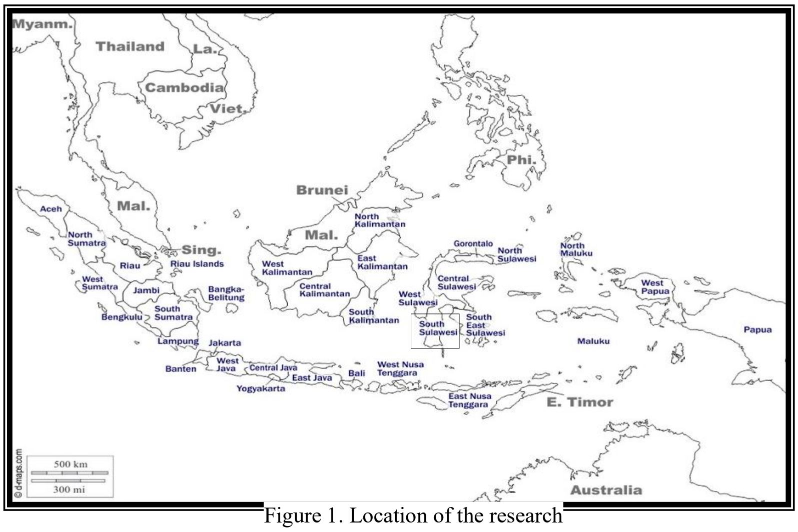

Figure 1. Location of the research

2.3. Data analysis
Data of plankton obtained were collected and identified and processed in Ms. Excel 2019 (Microsoft Office). Furthermore, the data were inputted in SPSS 22.0 (IBM, USA) with the ANOVA test to determine the difference in each parameter of each pond followed by the DUNCAN test with a confidence interval of 0.05.

3. Results and discussion

The results of plankton dominance showed that the Chlorophyta species had high dominance and were present in all shrimp ponds with the number was relatively stable in all shrimp DOC. The next dominant plankton group was diatom whose presence was stable and increased, especially at DOC 20 and 30 in ponds 4,5, and 6 (Figure 2). Meanwhile, the other 4 types of plankton, namely Dinoflagellates, Cyanophyta, Protozoa, and *Blue-Green Algae* (BGA) did not show high dominance. However, in ponds 2 and 6 the presence of BGA appeared higher compared to other shrimp ponds. Table 1 showed that generally the plankton found in the Pacific white shrimp intensive ponds in Bulukumba Regency dominated by Chlorophyta (73 - 83%), followed by the Diatom group (7.75 - 15.63%) and the *Blue-Green Algae* (BGA) group (7.13 - 13.50%).

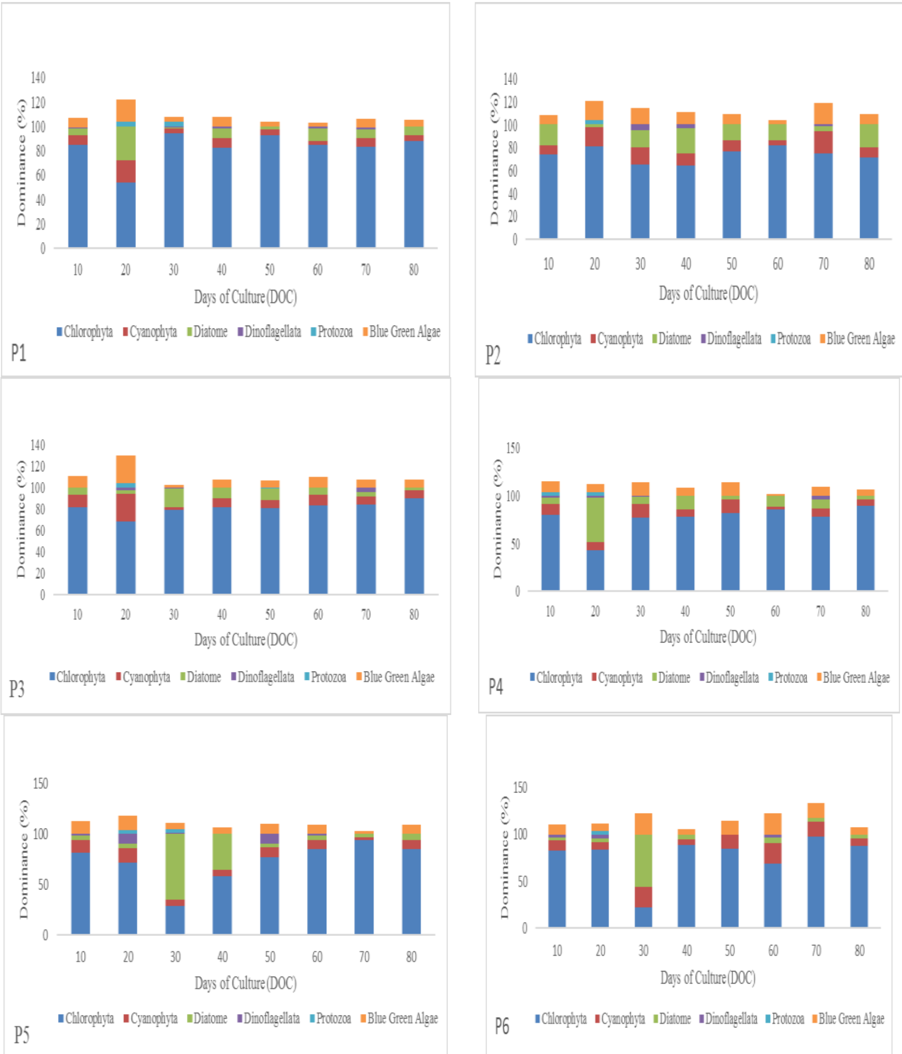

Figure 2. The dominance of plankton types (%) in P1) Pond 1, P2) Pond 2, P3) Pond 3, P4) Pond 4, P5) Pond 5, and P6) Pond 6

Table 1. .Percentage proportion (%) of Plankton (Mean ± SD, n = 8) in the medium for raising pacific white shrimp in intensive ponds in Bulukumba, South Sulawesi

Ponds	P1	P2	P3	P4	P5	P6
Chlorophyta	83.00±12.51	73.63±6.67	81.13±6.19	76.63±14.22	72.63±20.59	77.25±23.73
Cyanophyta	7.13±4.79	11.50±5.07	10.13±6.83	9.13±3.94	8.75±3.69	13.50±6.27
Diatome	8.63±8.33	13.75±6.98	7.75±4.83	13.13±14.12	15.63±22.89	10.13±18.62
Dinoflagellata	1.00±0.92	1.13±1.88	0.88±1.45	1.13±1.45	3.13±4.32	1.25±1.75
Protozoa	1.00±1.85	0.50±1.41	0.63±1.40	1.00±1.85	1.00±1.85	0.50±1.41
Blue-Green Algae	7.13±4.79	11.50±5.07	10.13±6.83	9.13±3.94	8.75±3.69	13.50±6.27

Chlorophyta was the type of plankton that dominated the presence in all observation ponds. Similar results were also reported by Cremen et al. [33] who stated that the utilization of green water technology can stimulate the growth of beneficial plankton/microalgae groups such as phytoplankton and maintains pond water quality parameters regardless of the high stocking density in the system. In the application of the *Multi-Trophic Aquaculture System* (IMTA), phytoplankton has an important role because it not only increases dissolved oxygen (DO) levels and captures excess nutrients from animal manure, but it is also useful as a natural feed for oysters. Likewise, oysters can control the density of microalgae and particulate matter in the pond which provides stability for DO levels and better water column transparency [34].

The presence of diatoms is necessary in shrimp culture system because of their role in maintaining water quality and nutrition of shrimp [35]. In addition, the application of diatoms in shrimp culture using biofloc system showed the improvement in shrimp productivity parameters such as higher body weight and a feed conversion ratio of 0.47 [36]. To date, the studies about potential diatoms showed the progress due to their use in commercial and industrial applications such as biofuels, pharmaceuticals, health, food, biomolecules, nanotechnology, and bioremediation of water pollution [37].

During 80 days of observation, BGA also showed a high percentage, especially in ponds 2 and 6 and the proportion of this type of plankton in all ponds showed a high amount. Blue-Green Algae (BGA) or cyanobacteria had habitats that vary from freshwater to marine and free-floating as well as periphyton (attached to pond surface) [38]. The result in this study showed that the high BGA dominance in ponds that can cause a certain disease syndrome called hemocytic enteritis in *Penaeus stylirostris*. Clinical symptoms of the disease are characterized by the occurrence of necrosis in the epithelial lining of the middle intestine and may also be in the dorsal cecum and hindgut gland, decreased shrimp productivity, and the findings indicates that certain *Oscillatoria* sp and other BGA species are also capable of causing this syndrome and are characterized by the presence bacteria such as *Vibrio* spp. The findings of this study support previous studies at the similar location that the population of *Vibrio* spp. had a high number in pond P2 that was more than 5.8×10^3 CFU / gr at DOC 70 [17]. These results confirmed that there was the interaction between the increase in the population of BGA and *Vibrio* sp. in shrimp farms. Apart from this, the presence of feces, metabolic waste, to the application of fermentation products and dolomite at the beginning, middle, and before harvest can also act as a source of nutrients that accumulate in pond water and stimulate the growth of certain types of plankton [25].

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Several solutions to control the explosion of BGA in shrimp ponds are : 1) reducing the frequency of excessive feeding, 2) application of probiotics and shrimp immunostimulants, 3) utilization of minerals by eating BGA which is rich in protein, lipids and carbohydrates can increase their immunity and help the shrimp body's resistance when the pond environment changes [39].

4. Conclusions

Our research findings showed that the dominance and percentage proportion of plankton in the intensive system cultivated with pacific white shrimp was dominated by Chlorophyta and Diatom with relatively stable growth in all ponds and shrimp age. However, control of the explosion of Blue-Green Algae should be carefully carried out to optimize the productivity of shrimp farming in South Sulawesi.

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