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Biodiversity of phytoplankton from polyculture milkfish and white shrimp vanname pond culture waters, Pekalongan region

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Abstract. The objectives to study the effect of Biodiversity of Phytoplankton on the productivity in Polyculture Milkfish and White shrimp vanname Pond Culture waters, Kandang Panjang Pekalongan Region, Centre of Java. Methodology The sampling have tried station T1, T2, T3, T4 were in pond culture of polyculture waters to identify a phyto plankton in polyculture pond Kandang Panjang waters. The sampling was carryout between February to Mei 2018. The result study showed that the value of the diversity indices in T1 treatment obtained the value of diversity indices ($H' = 1.093$), T2 obtained diversity values ($H' = 1.072$), T3 found ($H' = 1.804$) and T4 showed ($H' = 1.907$). The similiarity indexs are T1 (values, $E = 0.765$), values ($E = 0.606$), T3 ($E = 0.785$) and T4 ($E = 0.895$). The dominance indices values phyto plankton showed T1 (value $D = 0.725$), T2 ($D = 0.606$), T3 ($D = 0.595$) and T4 ($D = 0.578$). The diversity indices showed higher vlues at T4 showed variety of diversity indices ($H' = 1.907$). sampling site as compared to other three (T1, T2, and T3). During experiment showed the water quality of pond culture polyculture milkfish and white shrimp vanname was in viable condition.

1. Introduction

Many pond culture of polyculture Milkfish (M) and white shrimp vanname (V) waters sites areas of great importance for the biodiversity. natural in polyculture of pond culture sites can be considered can influence the abundance of phytoplankton showing good community structure, Similiarity, and dominance to effect increase productivity of milkfish and White shrimp Vanname [1][2].

Technological innovation of vanamei shrimp and milkfish polyculture by regulating the spacing of milkfish and controlling fito plankton will increase the production of vaname shrimp and milkfish [3][4][5]. The findings of this engineering of polluting technology are needed to increase the growth and production of vaname shrimp and milkfish. Current conditions indicate that the mortality of vanamei shrimp and milkfish which are maintained in high mortality polyculture reaches 80 to 90% [2][3][5][6][7] [8][9] suggests that to overcome the problem This research can be carried out in relation to ponds which are subjected to sea abrasion, so that the floating ponds are not utilized. One of them is the application of culture technology based on culture pens to overcome the disaster of ponds affected by abrasion. Pekalongan city is partly affected by sea abrasion. can not be used for the cultivation of vanamei shrimp and milkfish.

Pekalongan City is located in Central Java Province, where Central Java is very potential for the development of vanamei shrimp products, and milkfish with polyculture cultivation systems, because it has good freshwater and sea water resources, aquaculture ponds, bero ponds and unprocessed land for the cultivation of vanamei shrimp and milkfish (*Gracylaria* sp), it is still widely open. This is in accordance with the Central Java basic data information in figures [10][11] in the Fisheries Sub-Sector covering business activities of Marine Fisheries and Inland Fisheries.



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The objectives to study the effect of Biodiversity of Phytoplankton on the productivity in Polyculture Milkfish and White shrimp vanname Pond Culture waters, Kandang Panjang Pekalongan Region, Centre of Java.

2. Material and Methods

2.1. Material

The material in this study was Milkfish and vanamei shrimp (T1 = St-1:5 Milkfish+5 Vaname, T2 = ST-2:10 Milkfish+5 Vaname, T3 = St-3:5 milkfish+10 Vanamei, T4 = St-4:10 milkfish+10 Vanamei) per earth pond size 100 m², and type fish with initial weight of vanamei shrimp 1.79 ± 0.025 gr. Artificial feed used with 35% protein content, amount of feed given as much as 3% per biomass per day. The location was planted owned by Mr. Miftahudin, the chairman of Pokdakan Muara Rejeki in Kandang Panjang sub-district, Pekalongan City, Central Java, from April to August 2018).

The sampling have tried station are T1 = St-1:5 Milkfish+5 Vaname, T2 = ST-2:10 Milkfish+5 Vaname, T3 = St-3:5 milkfish+10 Vanamei, T4 = St-4:10 milkfish+10 Vanamei) per earth pond size 100 m². The treatment were in pond culture of polyculture waters to identify a phyto plankton in polyculture pond Kandang Panjang waters. The sampling was carryout between February to Mei 2018. Plankton samples collected using plankton net no. 25 and preserved using lugol solution

Observation of the number and types of plankton using a microscope and identified based on Odum (1971) [10] and Yamaji (1976) [11][12] and abundance using the counting cell formula [11]. Plankton quantitative analysis includes the calculation of the number of individuals, diversity, dominance, and uniformity of Shannon-Wiener [10].

The differences in plankton abundance, diversity, uniformity and dominance were analyzed descriptively.

The result study showed that the value of the diversity indices in T1 treatment obtained the value of diversity indices ($H' = 1.093$), T2 obtained diversity values ($H' = 1.072$), T3 found ($H' = 1.804$) and T4 showed ($H' = 1.907$). The similiarity indexs are T1 (values, $E = 0.765$), values ($E = 0.606$), T3 ($E = 0.785$) and T4 ($E = 0.895$). The dominance indices values phyto plankton showed T1 (value $D = 0.725$), T2 ($D = 0.606$), T3 ($D = 0.595$) and T4 ($D = 0.578$). The diversity indices showed higher vlues at T4 showed variety of diversity indices ($H' = 1.907$). sampling site as compared to other three (T1, T2, and T3). During experiment showed the water quality of pond culture polyculture milkfish and white shrimp vanname was in viable condition.

The research location was in the pond owned by Mr. Miftahudin, the chairman of Pokdakan Muara Rejeki in the Candang Panjang sub-district, Pekalongan City, Central Java, from April to August 2018.

2.2. Data obtained by absolute weight growth, survival, FCR

Growth

a. absolute weight growth

Absolute growth in this study can be calculated using the Effendie [10][11] formula as follows:

$$W = W_t - W_0$$

Information :

W = Absolute Weight Growth (g)

W₀ = Weight of test animals at the beginning of the study (g)

W_t = Weight of test animals at the end of the study (g)

b. Feed Conversion Ratio (FCR)

Feed conversion can be calculated by the Tacon (1987) formula, namely:

$$FCR = \{ \text{the amount of feed consumed} / [(\text{Final weight} + \text{Total weight fish death}) - \text{Initial weight}] \}$$

c. Survival Rate

Survival rate (SR) was calculated to determine the mortality rate of test animals during the study, survival can be calculated based on Effendi [10] formula as follows:

$$SR = N_t / N_0 \times 100\%$$

Information :

SR = Survival rate (%)

N0 = Number of test animals at the beginning of the study (tail)

Nt = Number of test animals at the end of the study (tail)

d. Plankton abundance

2.3. Type of diversity index (H')

Species diversity describes the wealth and distribution of collections of phytoplankton in a community. The diversity of species within a community expressed in one of the most common ways for marine ecological research is to use Shannon Wiener's richness index derived from information theory and aim to measure order and disorder Odum (1977)[12][13][14][15] (Smith, 1982, Krebs, 1989) namely:

$$\text{Shannon Index -Wiener: } H' = - \sum_{i=1}^s (\text{Log } p_i^2)$$

That is :

p_i = Comparison between the number of types of individuals to i and the total number individual (n_i / N)

s = number of species.

Shannon-Wiener diversity index values between 0 to ∞ with the following criteria:

$H' < 3.2$, small population diversity.

$3.2 < H' < 9.9$ diversity of moderate population.

$H' > 9.9$, large population diversity.

2.4. Type uniformity

Type uniformity is the composition of each type found in the community (Krebs, 1989)[12][15][16][17]. Type uniformity is obtained by comparing the diversity index with its maximum value, namely:

Type uniformity index (E), $E = H1 / H1_{\max}$, where:

$H1$ = Shannon-Wiener diversity index.

$H1_{\max} = \text{Log}_2 s$ = maximum diversity index

s = number of species.

The uniformity value of a population ranges from 0-1 with the following criteria:

$E < 0.4$: Balance of small population.

$0.4 < E < 0.6$: balance of moderate population.

$E > 0.6$: Large population balance.

2.5. Dominance Type

This type of dominance is used to obtain information about the types of organisms that dominate a community in each habitat, because in the community not all types of organisms have an equally important role in determining the nature of the requirements of the community. There are only a few

3. Results and Discussion

3.1. Research result

The results showed that the engineering of vaname shrimp and milkfish polyculture at different spacing significantly affected ($P < 0.05$), on growth and survival and affected community structure and abundance of phytoplankton. Furthermore, [17][18] we obtained the absolute weight growth of Vanamei shrimp (*L. vannamei*) (g) on T4 (27.53 ± 0.04 g), Vanamei shrimp life (90.25%), Vanamei shrimp FCR ($\text{FCR} = 1.19 \pm 0.05b$), as well as milkfish *Gracillaria verocosa* on the highest T4 growth of absolute weight of milkfish (*Gracillaria verocosa*) (g), namely $2905.05 \pm 7.5b$ and kelulushidup T4 ($93.33 \pm 0.25\%$).

2. Absolute weight growth of Vanamei shrimp

Based on the results of the research analyzed the diversity (F test), showed a very real effect ($P < 0.01$) on absolute weight growth, this shows that the effect of feed given artificial feed with a protein content of 35% showed a very real effect, while based on the test Tukey'S showed a very significant difference. Growth of absolute weight in the highest vannamei shrimp was at T4 (shrimp vanamei T4 (27.53 ± 0.04 g), (Table.1).

Based on the results of the analysis of variance showed a very significant effect ($P < 0.01$) on absolute weight growth on vannamei shrimp.

Based on the results of variance analysis showed that there was a very significant effect on the growth of absolute weights of vannamei shrimp ($P < 0.01$), and with the Tukey's test showed a significant difference between the treatment of T4-T3, T4-T2, T4-T1. The difference in difference between the treatment of middle values shows that the application of vanamei shrimp and milkfish polyculture technology at different spacing can increase the different growth of vanamei shrimp and be able to increase growth and improve environmentally friendly farming environment. This is supported by the opinion of Mangampa and Burhanuddin (2014) [19][20-25] that with the application of artificial feed engineering enriched with probiotics, a dose of 10 ml/liter of artificial feed probiotics (positive properties) is sprayed on artificial feed (40% protein content) to increase the power of the farm to improve quality and vanamei shrimp production, sprayed on feed with 35% protein content and environmental improvement[26-28], using system biofilter (on inlet and outlet given *Gracillaria* sp) with spacing between milkfish strands, able to improve the water quality environment and accelerate the growth of vannamei shrimp, because it is able to utilize feed well. This is consistent with the opinion [29-32].

Aslam et al (2009)[33][34-36] showed shrimp polyculture vaname and milkfish can improve growth well, because both species do not compete in space, feed, and are able to grow both well by giving probiotic battery probiotics such as *Lactobacillus* sp, *Bacillus* sp. growing, artificial feed systems enriched with probiotics can help digestion. feed and absorb nutrients feed more efficiently and the role of milkfish synergistically acts as a good system biofilter [37-40].

This is also reinforced by the opinion of Huet (1971)[22-25], suggested that physical growth occurs with changes in the number or size of cells making up body tissues, morphologically growth can be seen from changes in body shape, increase in cells and tissue, and weight. Growth will occur if the energy requirements for metabolism and maintenance of body tissues have been fulfilled according to fish needs [41][42-44] (see Table.1.).

Table.1. Absolute weight growth of Vanamei shrimp (*L. vannamei* (g), milkfish (*Channos channos* Forskall) FCR.

	T1 (5M+5V)	Treatment*) T2 (5M+10V)	T3 (10M+5V)	T4 (10M+10V)
Absolute weight growth of Vanamei shrimp (<i>L. vannamei</i> (g) (<i>L. vannamei</i> (g)	21.97±0.24 ^c	22.91±0.10 ^b	24.41±0.19 ^b	27.53 ± 0.04 ^a
Absolute weight growth of milkfish (<i>Gracilaria verocosa</i>)(g)	2518.03± 6.8 ^b _c	2715.03± 6.6 ^b	2817.03± 8.7 ^b _b	2905.05±7.5 ^a
Survival rate of white shrimp (%)	75.25±0.55 ^c	85.25±1.95 ^b	87.75±1.79 ^b	90.25±0.25 ^a
Survival rate of milkfish (%)	70.75±2.93 ^c	80.25±1.15 ^b	85.75±1.83 ^b	93.33±0.25 ^a
FCR white shrimp	3.15±0.05 ^a	2.35±0.15 ^a	1.87±0.85 ^b	1.19±0.05 ^a

Note : tried station T1,T2,T3,T4 were in pond culture of polyculture of milkfish and white shrimp different density in the waters to identify a phytoplankton in polyculture pond Kandang Panjang waters

T1 (5 M+ 5 V): given 5 seeds / m² milk fish and 5 seed vanamei shrimp , T2 (5 M + 10 V) = 5 heads / m² 10 vanamei shrimp, T3 (10M + 5 V) = 10 heads / m² milkfish and 5 vannamei shrimp, T4 (10M + 10V) = given 10 fish / m² milkfish and 10 vannamei shrimp.

3.3. Absolute weight growth of milkfish

Based on the results of the research analyzed the diversity (F test), showed a very real effect ($P < 0.01$) on the growth of absolute weight of milkfish, with the Tukey's test showed the difference in the middle value of T4-T3, T4-T2, T4-T1 is significantly different ($P < 0.05$). Furthermore from Table.1, also shows that the cultivation system of vaname shrimp polyculture with milkfish at different plant spacing with the highest absolute weight growth of *Gracillaria* sp T4 (10B + 10V) $2905.05 \pm 7.5b$ g milkfish (Table.1). Furthermore, from the difference in growth with the difference in the level of density of vannamei shrimp seeds and milkfish and milkfish seeds stocked with polyculture maintenance. This good growth is due to artificial feed which has a good nutritional content in the feed that is 35% protein content so that it will accelerate growth well. This shows that compared with other researchers at the same time maintenance is higher growth.

3.4. Survival rate of white shrimp vannamei

Based on the results of the study showed that the highest survival of vannamei shrimp in T4 treatment was $(90.25 \pm 0.25a\%)$, (Table 1).

Furthermore, based on the results of the analysis of variance showed a very real effect ($P < 0.01$) on the survival of vanamei shrimp. Furthermore from Table .1 shows that the difference in density in vannamei shrimp and milkfish with polyculture cultivation system showed a very significant effect on the survival of vannamei shrimp ($P < 0.01$), then Tukey'S test showed a significant difference between T4-T3, T4 treatment. -T2, T4-T1. There is a very real influence because of the use of artificial feed which contains high nutrient feed according to their needs and the role of milkfish as and the spacing of different milkfish and milkfish which has another role as a biofilter system by installing *Gracillaria* sp milkfish around the culture pen in the maintenance of vannamei shrimp with polyculture milkfish this can improve water quality and can improve the survival of vannamei shrimp [41-44] Good water quality in milkfish and vanamei shrimp polyculture cultivation could increase to 80-90 %, these results lower when compared with the results of the study on T4 treatment (20 stocking density of milkfish and 20 Vana shrimp shrimp fries me / m²) with the result of survival $96.71 \pm 0.85c\%$. This opinion is also strengthened by other researchers who maintain milkfish with vanamei shrimp polyculture system by Istiyanto et al. [38][43].

3.5. Survival rate of milkfish

Then from the results of research using polyculture technology with simultaneous maintenance of vaname shrimp with milkfish at different plant spacing based on artificial feed and the role of milkfish as a biofilter system showed that the highest survival rate in T4 treatment was milkfish which was $93.33 \pm 0.25\%$.).

Furthermore, from the results of the study presented in Table 1, the analysis of the variance in the presence of *vaname shrimp polyculture* with milkfish at different spacing showed a very significant effect on the survival of milkfish ($P < 0.01$). Furthermore, with the Tukey'S test showed significant differences between treatments T4-T3, T4-T2, T4-T1. This shows that the influence of the environment is the use of *Gracillaria* sp on

maintenance of polyculture and vannamei shrimp and milkfish at different spacing can improve water quality, because *Gracillaria* sp type milkfish is able to absorb suspended solids, organic waste, suspended solids so that the water quality is better and more feasible. The results showed that in polyculture with 10 tails / m² vanamei shrimp and milkfish with a spacing of 40 cm) (T4) produced

the highest survival rate of $93.25 \pm 0.57\%$. This high survival rate is because the spacing of milkfish is very effective in increasing the best survival [26-30].

3.6. Food Conversion Ratio (FCR)

The results showed that the lowest food conversion ratio in T4 treatment was FCR (food conversion ratio), namely $1.15 \pm 0.09b$ (Table.1). The results of the analysis of variance showed a very significant effect ($P < 0.01$) on feed conversion ratio (FCR) on vanamei shrimp. $93.33 \pm 0.25\%$. Furthermore, from the results of the analysis of variance with the difference in vannamei shrimp and milkfish at different plant spacing with the polyculture system had a very significant effect on FCR ($P < 0.01$) and based on the tukey test showed significant differences between the middle values of T4-T3, T4-T2, T4-T1. Then with the difference in vannamei shrimp and milkfish polyculture systems, so that it will affect the difference in consuming food, which causes the FCR value is also different, it can be seen that the FCR value in the T4 treatment is lower $1.19 \pm 0.05a$ meaning that the feed is more efficient, so by utilizing artificial feed given in T3, T2, T1 treatments.

This is consistent with the opinion of Reksono et al (2012) [29] [30-32], stated that the feed conversion ratio is a very important role to see whether the feed given is able to increase the growth of vanamei shrimp and milkfish with better growth or whether the feed is given more efficiently. Feed conversion value can also see how far the feed provided can improve growth better / faster growth

3.7. The abundance of fito plankton

Vaname shrimp polyculture with milkfish at different spacing can influence the abundance of fito plankton showing good community structure because of the H value, high diversity index, low dominance value and good compatibility value (see table. 2.3.). by observing phytoplankton in aquaculture systems of vaname shrimp and milkfish at different plant spacing producing 26 genera of plankton consisting of 10 genera of phyto plankton found 4 classes, namely Bacillariophyceae consisting of 8 genera, Chlorophyceae 1 genera, Cyanophyceae 1 genera and Dinophyceae 1 genera, both in treatments T1, T2, T3 and T4 (Table 2.3) Furthermore, the number of individuals obtained in the study is like an average of 118.75 ind/L, then it is seen that the number of species and individuals of fito plankton is relatively higher than that of vanamei shrimp and grass *Gracillaria verocosa* sea can affect the number of species and the number of individuals phytoplankton According to Hooker, et al [44] [45-47], where the number of species and individuals of plankton is higher than the system of vanamei shrimp cultivation by utilizing biofloc in ponds, namely the number of genera, only 8 genera consisting of 6 genera of phytoplankton and 53 individuals/L. This is supported by the opinion of José-Gilberto et al. (2018) [48][49-52] the high percentage of phytoplankton obtained in this study is due to the continuous availability of nutrient elements through feed. The increase in the speed of the number of genus and individuals in this study is the provision of feeding and fertilizer.

Plankton monitoring includes observations of phytoplankton consisting of 10 phytoplankton genera which are dominated by Bacillariophyceae class, 6 genera and other genera from Chlorophyceae 1 genera class, Cyanophyceae 1 genera from Dinophyceae 1 genera. Based on observations of phytoplankton composition in accordance with the growth needs of vanamei shrimp and milkfish *Channos channos* Forskall in the cultivation of polyculture systems in ponds. This can be seen from the habit of vanamei shrimp eating phytoplankton, especially the Bacillariophyceae class (Abid et al. [53] [54-57]) said that natural food preferred by Vanamei shrimp compared to other classes. Then from the observations during the study showed that the increase in the abundance of phytoplankton caused by, among others, in the dry season the presence of planktonic genera could increase abundance of certain genera. So is in the rainy season can also increase the abundance of phytoplankton genera. The fluctuations of the abundance of phytoplankton genera are influenced by several factors including temperature, pH, concentration of nutrients, light, weather, disease, predation of vaname shrimp and fito plankton, competence between species, algae toxins (Boyd, 1980). Furthermore, based on observations of abundance of phytoplankton, number of genera, and views of biological indices such as diversity, uniformity and dominance can be seen in Table 5.2. Based on the

abundance of phytoplankton during the study showed abundance ranging from 107 to 1,264 ind/L has a relatively higher range between phytoplankton abundance in the study of vaname shrimp culture ponds with modular systems [56-59]. Due to the low abundance of phytoplankton in this study, it was caused at the same time to grow very dense, because nutrient elements are widely used by Kwon et al. [16][12-18][59-62] based on the results of Selma's observations, research showed that the effect of adding feed on the cultivation of vaname shrimp polyculture system with *Gracillaria verocosa* milkfish in ponds had a significant effect ($P < 0.05$).

The influence of vaname shrimp and milkfish polyculture affects the abundance and community structure of phytoplankton because as a substitute feed, the role of phytoplankton as a feed is shown by the lower abundance of phytoplankton in reducing feed intake than without reducing feed ration [59-63] said that feed needed for natural food (phytoplankton) and feed needed during enlargement of vaname shrimp and milkfish during maintenance can be predicted from the value of feed conversion ratio (FCR). Likewise the presence of natural food and other feed apart from the feed given will decrease the FCR value, is close to equal to or value 1. This value is due to the use of the type of feed other than artificial feed given artificial feed. The feed provided includes the presence of microorganisms available in ponds, plant material and detritus and flocculants (Table.2).

Table. 2 Plankton genus consisting of phytoplankton observed during the study on vanamei shrimp and milkfish polyculture *Channos channos* Forskall

Treatment	phytoplankton type (genera)
T1 (5 M+ 5 V)	Ceratium, Coscinodiscus, Baderistrum, Chaetoceros, Geotrichia, Navicula, Odontella, Oscillatoria, Pleurosigma,
T2 (5 M + 10V)	Chaetoceros, Ceratium, Coscinodiscus, Baderistrum, Geotrichia, Navicula, Odontella, Oscillatoria, Thallasionema
T3 (10M + 5 V)	Coscinodiscus, Geotrichia, Navicula, Baderistrum, Chaetoceros, Ceratium, Pleurosigma, Thallasionema
T4 (10M + 10V)	Baderistrum, Oscillatoria, Pleurosigma, Thallasionema Chaetoceros, Ceratium, Coscinodiscus, Geotrichia, Navicula, Odontella,

Information :

T1 (5 M+ 5 V): given 5 seeds / m² milk fish and 5 seed vanamei shrimp , T2 (5 M + 10 V) = 5 heads / m² 10 vanamei shrimp, T3 (10M + 5 V) = 10 heads / m² milkfish and 5 vanamei shrimp, T4 (10M + 10V) = given 10 fish / m² milkfish and 10 vanamei shrimp.

Based on Table .2. showed that the value of the diversity index in T1 T1 (5 M+ 5 V): given 5 seeds / m² milk fish and 5 seed vanamei shrimp obtained the value of diversity ($H' = 1.093$), T2 (5 M + 10 V) = 5 heads / m² 10 vanamei shrimp obtained diversity values ($H' = 1.072$), T3 (10M + 5 V) = 10 heads / m² milkfish and 5 vanamei shrimp found the value of diversity ($H' = 1.804$) and T4 (10M + 10V) = given 10 fish / m² milkfish and 10 vanamei shrimp with a variety of diversity ($H' = 1.907$). Then from the results of the diversity value on average $H' = 1.469$, indicating more than $H' > 1$, meaning that plankton conditions in pond waters are relatively good or the pond conditions are good enough. This value shows the condition of the community (plankton, vaname shrimp and milkfish) with the change in the pond waters environment is quite stable. This is in accordance with Odum (1971)[12] if the value of H' diversity < 1 then the biota community is declared unstable, if the value of H' ranges between 1-3 then the stability of the biota community is moderate, whereas if the diversity value is $H' > 3$ then the stability of the biota community concerned is in a very stable condition (prime condition). Furthermore, based on observations of the harmony of the biota, the value of the uniformity index (see table 2) shows that the result is the uniformity index at T1 treatment are (5 M+ 5

V): given 5 seeds / m² milk fish and 5 seed vanamei shrimp obtained uniformity values ($E = 0.765$), T2 (5 M + 10 V) = 5 heads / m² 10 vanamei shrimp obtained uniformity values ($E = 0.606$), T3(10M + 5 V) = 10 heads / m² milkfish and 5 vannamei shrimp found uniformity values ($E = 0.785$) and T4(10M + 10V) = given 10 fish / m² milkfish and 10 vannamei shrimp with supply harmony n ($E = 0.895$). Based on the value of the genus uniformity index, the average value of $E = 0.7995$, means that the uniformity of the genus fito plankton is relatively even or said the number of individuals in each genus is relatively the same, the difference is not significant or almost the same. This is supported by the opinion of [12][62-65] if the value of $E > 0.75$ shows a high uniformity value but vice versa if the value of E is < 0.75 , the uniformity value in the biota (genus plankton) is low (see Table.3).

Table.3. Number of individuals and genus as well as diversity index (H'), uniformity (E) and dominance (D) phyto plankton in the cultivation of Vanamei shrimp and milkfish polyculture *Channos channos* Forskall

Perlakuan	Number of individuals (ind / L)	indeks		
		Diversity (H')	Similarity (E)	Dominance (D)
T1 (5 M+ 5 V)	112	1.093	0.765	0.725
T2 (5 M + 10 V)	115	1.072	0.753	0.606
T3 (10M + 5 V)	119	1.804	0.785	0.595
T4 (10M + 10V)	129	1.907	0.895	0.578
Mean	118.75	1.469	0.7995	0.626

Information :

T1 (5 M+ 5 V): given 5 seeds / m² milk fish and 5 seed vanamei shrimp , T2 (5 M + 10 V) = 5 heads / m² 10 vanamei shrimp, T3 (10M + 5 V) = 10 heads / m² milkfish and 5 vannamei shrimp, T4 (10M + 10V) = given 10 fish / m² milkfish and 10 vannamei shrimp.

This showed the results of observations (Table.3) the index value of plankton dominance in aquaculture of vaname shrimp and milkfish (*Channos channos* Forskall) aquaculture at T1 (5 M+ 5 V): given 5 seeds / m² milk fish and 5 seed vanamei shrimp treatment value $D = 0.725$, T2 dominance value (5 M + 10 V) are D value = 0.606, T3 (10M + 5 V) are value $D = 0.595$ and T4 (10M + 10V) are dominance value $D = 0.578$. Based on the dominance value, the average dominance is $D = 0.626$, this shows the fito plankton community structure in pond waters with a polyculture system vanamei shrimp and milkfish *Channos channos* Forskall there is no genus dominance or in other words there is no genus of phytoplankton that dominates the other genus in the extreme, according to Odum {1971}, [10-12], plankton conditions in the pond waters suggest the dominance index ranges from 0-1, if approaching zero means that in the community structure of the biota, there is no genus that is dominantly dominating the other genus.

Water quality of maintenance media in polyculture cultivation technology

Monitoring during the study showed that the water quality was feasible for polyculture cultivation of vaname shrimp and milkfish technology at different planting distances from the polyculture system (Table.4), because it uses a biofilter system by filtering water quality in the inlet and out let using milkfish (Table .4).

Table. 4. Water quality data resulting from the use of biofilter systems a spacing of 40 cm),

Water Quality Parameter	Range	References
Oxygen dissolved (mg/l)	5,25 – 6,75	>4 mg/l ^{a,b}
Temperature (°C)	26,5 – 29,5	26,5 – 35 °C ^{c,d}
Salinity (ppt)	20.5 – 28,5	15 – 30 ^{c,d}
pH	7.5 – 8,5	7,5 – 8,7 ^{c,d}
PO ₄ -P (mg/L)	0.078-2.981	0.27-5.51 ^f
BOT (mg/L)	32.075-49.75	
Ammonia (mg/l)	0.01– 0,15	<1 mg/l ^{c,d,e}
Transparency (Ål cm–1)	21	60–80 ^{a,b,g}
N-O3 (mg L–1)	0.0–1.45	

Legend: (Beck et al,2018^a, [51], Borey et al.1982^b,[52] ,Elloumi et al.(2006)^c [55],Zhongneng and Boyd (2016)^d [63], Yoshida et al.(Kai et al.(2016)^e [64]. Reynolds, (1989)^f[65], Nybakken,(1992)^g[66].

Based on Table .4. showed that with vaname shrimp and milkfish polyculture at different planting distances showed different influences on the quality of media maintenance of vaname shrimp and milkfish, in addition to the use of biofilter systems on water quality management media maintenance of vannamei shrimp and milkfish in polyculture systems produced water quality which is feasible for the maintenance of polyculture systems, and environmentally friendly, because it uses milkfish as a biofilter that is placed in the inlet and out let maintenance plot, and is able to increase survival in vaname shrimp 98.25% ± 2.25a and survival rate of milkfish 93.25 ± 0.57a%. Water quality during the study showed dissolved oxygen (4.25 - 5.85 mg / l), temperature (25.5 - 29.5 oC), salinity (19.5 - 27.5 ppt), ammonia (0.02 - 0.15 mg / l). The water quality content shows the feasibility for the maintenance of milkfish and vannamei shrimp in accordance with the opinions (Beck et al,2018^a, [51],[52][55][63-66].

4.Conclusion

The result study showed that the value of the diversity indices in T1 treatment obtained the value of diversity indices (H' = 1.093), T2 obtained diversity values (H' = 1,072), T3 found (H' = 1,804) and T4 showed (H' = 1,907). The simillarity indexs are T1 (values, E = 0.765), values (E = 0.606), T3 ((E = 0.785) and T4 (E = 0.895).The dominance indices values phyto plankton showed T1 (value D = 0.725), T2 (D = 0.606.), T3(D = 00.595) and T4 (D = 00.578).The diversity indices showed higher vlues at T4 showed variety of diversity indices (H' = 1,907).sampling site as compared to other three (T1,T2, and T3). During experiment showed the water quality of pond culture polyculture milkfish and white shrimp vanname was in viable condition

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