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Polyculture Engineering of White Shrimp Vannamei and Seaweed on Different Planting Distance on The Growth, Survival in Abration Pond

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ABSTRACT

The objective of the study was to assess the role of polyculture engineering of vanamei shrimp, and seaweed in an effort to increase growth and survival. The experimental method was randomized complete design with 4 treatments and 3 replications were T1 (10 PL / m^2 white shrimp vannamei and seaweed distance 15 cm), T2 (10 PL / m^2 of white shrimp vannamei and seaweed distance 30 cm), T3 (10 PL / m^2 white shrimp vanamei and seaweed distance 45 cm, T4 (10 PL / m^2 white shrimp vanamei and seaweed 60 cm). Seaweed used *Gracillaria sp* type 150 g / bundle with treatment used a long line system placed around the nets plot of 1 m^2 in pond culture 300 m^2. Data includes the growth of absolute weight, survival, FCR were analyzed variety and test Tukey. observation of the water quality of maintenance media include nitrite, ammonia, temperature, pH, salinity using descriptive. There is a very real effect ($P < 0.01$) on treatment with different plant spacing on seaweed and vanamei shrimp on growth and survival of white shrimp vanamei and seaweed. The highest absolute weight growth in vanamei shrimp was T4 treatment (vanamei shrimp 29.25 ± 0.07 g), and seaweed (2919.03 ± 8.70^{b}g) of white shrimp vanamei survival rate (98.25% ± 2.25%) and FCR (food Conversion ratio) 1.15 ± 0.09. Water quality is still feasible optimum.

Keywords: *Polyculture, white shrimp vanamei, growth, survival*

1. Introduction

Polyculture technology is simultaneously maintaining two species or more maintained in the pond. This polyculture can be done, among others, by simultaneously maintaining vanamei shrimp and Gracillaria sp. This polluting technology is more profitable than monoculture because it can produce higher production and the economic value of milkfish and seaweed is also higher.

The objective of research was to the role polyculture engineering of vanamei shrimp (*litopenaeus vannamei*, Boone) , and seaweed in an effort to increase growth and survival, the reason for using experimental animals is vanamei shrimp and seaweed polyculture, because it has a mutually beneficial relationship symbiosis occurs, in which vanamei shrimp excrete dirt and the remaining feed is decomposed into detritus then converted into nitrogenous nutrients, phosphate and potassium. The nutrient is used by seaweed as fertilizer, so it can accelerate the growth of seaweed. Likewise vice versa seaweed is used by shrimp Vanamei as a shelter from sunlight (ultra vioet) which kills vanamei shrimp. Planting seaweed determines the growth and utilization of detritus as seaweed fertilizer to grow to the maximum.

2. Materilas and Methods

2.1. Materials

The experimental method was randomized complete design with 4 treatments and 3 replications were T1 (10 post larvae (PL) / m^2 white shrimp vannamei and seaweed distance 15 cm), T2 (10 PL / m^2 of white shrimp vannamei and seaweed distance 30 cm), T3 (10 PL / m^2 white shrimp vanamei and seaweed distance 45 cm, T4 (10 PL / m^2 white shrimp vanamei and seaweed 60 cm). Seaweed used *Gracillaria sp* type 150 g / bundle with treatment used a long line system placed around the nets plot of 1 m^2 in pond culture 300 m^2, the reason for the composition of white shrimp Vanamei post larvae 10 (PL 10) and the spacing to get

White shrimp Vanamei joint in according with the level of *Gracillaria* sp.

Data includes the growth of absolute weight, survival, Food convertion ratio (FCR) were analyzed varian and test Tukey. The water quality data (temperature, salinity, pH, O_2, NO_2, NH_3) were analyzed by descriptive.Parameters observed in Gracilaaria sp seaweed growth weight, long growth.

2.2. Pond and water quality

Measurement of water quality in ponds by maintaining vanamei shrimp and seaweed shows good water quality and vanamei shrimp and seaweed grow well. The tools used to measure water quality such as hand refractor meters, do meter to measure dissolved oxygen thermometers for measuring temperature, spectrophotometers for measuring nitrite, nitrate,The two nutrients; while nutrient analysis was done using samples of 355 ml which were transported in a styrofoam box. The parameters for water quality were temperature, salinity, pH, O_2, NO_2, NH_3.

3. Results and Discussion

3.1. Absolute growth of white shrimp

On The results showed that the difference of planting distance of seaweed and white shrimp vanamei showed highly significant ($P < 0,01$) on growth and survival of white shrimp vanamei and seaweed. The highest absolute weight growth in vanamei white shrimp was T4 ((10 PL / m^2 white shrimp vanamei and seaweed 60 cm). were treatment T4 (vanamei shrimp 29.25 ± 0.07 g), and seaweed (2919.03 ± 8.70^bg) of white shrimp vanamei survival rate (98.25% ± 2.25%), Survival rate of seaweed (93.25±0.57^a %) and FCR (food Conversion ratio) 1.15 ± 0.09. Water quality is still feasible optimum by Boyd *et al* (1982), Kanazawa (1985), Nurjana (2007), Istiyanto and Rachmawati (2016), .

Table 1. Absolute weigh growth based on weight (g), survival on a variety of treatments in polyculture *L. vannamei* (g) and seaweed

	Treatment*)			
	T1 (10V+15SG)	T2 (10V+30SG)	T3 (10V+45BSG)	T4 (10V+60SG)
Absolute weigh growth of *L. vannamei* (g)	21.97±0.24^c	22.91±0.10^b	24.41±0.19^b	29.25 ± 0.07^a
Absolute weigh growth of seaweed (g)	2518.03 ± $6.8^{b\,c}$	2715.03 ± 6.6^b	2817.03 ± 8.7^b	2919.03 ± 8.7^b
Survival rate of *L .vannamei* (%)	75.25±0.55^c	99.25±1.95^b	93.72±1.79^b	98.25% ± 2.25^a
Survival rate of seaweed (%)	70.75±2.93^c	85.25±1.15^b	90.75±1.83^b	93.25±0.57^a
FCR seaweed	3.15±0.05^a	2.35±0.15^a	1.87±0.85^b	1.15±0.09^b

Information

Treatment were T1= 10V+15SG (10 PL / m^2 white shrimp vannamei and seaweed *Gracillaria* sp distance 15 cm), T2=10V+30SG (10 PL / m^2 of white shrimp vannamei and seaweed *Gracillaria sp* distance 30 cm), T3= 10V+45 SG (10 PL / m^2 white shrimp vanamei and seaweed *Gracillaria sp* distance 45 cm, T4= (10V+60SG) 10 PL / m^2 white shrimp vanamei and seaweed *Gracillaria sp* 60 cm). Seaweed used *Gracillaria sp* type 150 g / bundle with treatment.

3.1. Water quality of maintenance media on polyculture cultivation technology

Monitoring during the study demonstrated a decent water quality for the cultivation of vannamei milkfish and shrimp with a polyculture system (Table.2), as it uses a biofilter system by filtering water quality in inlet and out let using seaweed (Table 2).

Table 2. Water quality data resulting from the use of biofilter system

Water Quality Parameters	Range	References
Oxygen disolved (mg/l)	5,25 – 6,75	>4 mg/l [a,b]
Temperature (^{0}C)	26,5 – 29,5	26 – 35 ^{0}C [c,d]
Salinity (ppt)	20.5 – 28,5	15 – 30 [c,d]
pH	7.5 – 8,5	7,5 – 8,7 [c,d]
Ammonia (mg/l)	0.01– 0,15	<1 mg/l [c,d,e]
Transparency (À1 cm–1)	21	60–80[a,b]
N-O3 (mg L–1)	0.0–1.45	

Legend: (Nurjana.2007[a], Kanazawa, 1985[b], Kurmaly, 1995[c], Kanazawa, 1985[d], Boyd *et al.*1982[e]).

Based on Table 3, it is shown that by using biofilter system on water quality management of fish milkfish and shrimp vannamei polyculture system produces decent water quality for polyculture system maintenance and environmentally friendly, because it uses seaweed as biofilter placed in inlet and ou (7,25 - 5,85 mg / l), the temperature (25.5 mm) was found to increase the survival rate of 93.73 ± 0.39c% fish and he use of seaweed can increase the growth of shrimp Vanamei because seaweed in addition to acting as a shelter, also plays a role to improve the living media environment of Vanamei shrimp, so it will trigger live shrimp in a good confusion, and able to increase shrimp growth quickly because eat better 96.71 ± 0.85c% vannamei shrimp. Water quality during the study showed dissolved oxygen (4.25 - 5.85 g / l) - 29.5 oC), salinity (19.5 - 27.5 ppt), ammonia (0.02 - 0.15 mg / l). The content of water quality shows the feasibility for the maintenance of milkfish and shrimp vannamei in accordance with the opinion Nurjana, (2007), Kanazawa (1985), Kurmaly (1985).

4. Conclusion

The The results showed that the difference of planting distance of seaweed and white shrimp vanamei showed highly significant (P <0,01) on growth and survival of white shrimp vanamei and seaweed. The highest absolute weight growth in vanamei shrimp was T4 treatment (vanamei shrimp 29.25 ± 0.07 g), and seaweed (2919.03 ± 8.70^{b}g) of white shrimp vanamei survival rate (98.25% ± 2.25%) and FCR (food Conversion ratio) 1.15 ± 0.09. Water quality is still feasible optimum.

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