PAPER NAME

05 03 2024 EFFECT OF ADDITION OF MA NGROVE EXTRACT.pdf

WORD COUNT

4522 Words

CHARACTER COUNT

23889 Characters

PAGE COUNT

10 Pages

FILE SIZE

446.9KB

SUBMISSION DATE

Mar 5, 2024 2:38 PM GMT+7

REPORT DATE

Mar 5, 2024 2:39 PM GMT+7

10% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

- 10% Publications database
- Crossref database
- Crossref Posted Content database

Excluded from Similarity Report

- Internet database
- Bibliographic material
- Quoted material
- Cited material
- Small Matches (Less then 8 words)

EFFECT OF ADDITION OF MANGROVE EXTRACT Sonneratia caseolaris FOR THE GROWTH OF CANTANG GROUPER (Ephinephelus fuscoguttatus x Ephinephelus lanceolatus)

M. Bahrus Syakirin[1], Nailatul Khairoh[1],Tri Yusufi Mardiana[1], Linayati Linayati [1], Ashari Fahrurrozi [1], Wijianto Wijianto[1], Nauval Rabbani[2], dan Heri Ariadi [1#]
[1]Departement of Aquaculture, Faculty of Fisheries, Pekalongan University
[2]Departement of Conctruction Engineering, Faculty of Engineering, Pekalongan University
*Corresponding author : ariadi_heri@yahoo.com

Abstract

This study aims to evaluate the digestibility of feed and growth of cantang grouper fed artificial feed with the addition of pedada mangrove fruit extract. This research was carried out at the Laboratory of Brackish and Sea Water Cultivation, Faculty of Fisheries, University of Pekalongan. The test fish were cantang grouper with a size of 4-5 cm with a stocking density of 1 fish/L. This study used a completely randomized design (CRD) which consisted of 4 treatments and 3 replications. Treatment A (control) without pedada mangrove fruit extract, treatment B with an extract dose of 5 ml/kg of feed, treatment C with an extract dose of 10 ml/kg of feed and treatment 4 with an extract dose of 15 ml/kg of feed. The results of the study through statistical analysis, administration of papain enzyme extract doses was able to provide a significant effect (P<0.05). Parameters observed were absolute biomass growth, FCR, EPP, SR and water quality. Feeding was done 3 times a day with a maintenance period of 30 days. The results showed that the cantang grouper which was fed with the addition of mangrove fruit extract 15 ml/kg of feed produced the highest average absolute biomass growth in treatment D of 37.98 grams, FCR 1.10, EPP 90.69%. SR 100%. Water quality temperature 28-30 oC, pH 7-8.5, salinity 30-33 ppt and DO 5.4-6.7 ppm. These results indicate that the quality of the water during the study was still within the range of the quality standards. The conclusion from the results of this study was that the addition of pedada mangrove fruit extract at different doses had a very significant effect on growth, feed efficiency and feed conversion rate for cantang grouper with the best dose of 15 ml/kg feed.

Keyword : *Pedada, FCR, feed, survival, water quality*

INTRODUCTION

Cantang grouper is an important export commodity in the fisheries sector (Puputungan et al, 2017). The export value of Indonesian grouper fish in 2017 reached US $ 16.42 million with a percentage increase of 30.75% / year (Hamsah, 2018). One of the most popular grouper fish commodities for aquaculture is the cantang grouper (*Epinephelus fuscoguttatus-lanceolatus*). Cantang grouper is the result of a cross between tiger grouper and kertang grouper which has a better level of cultivation productivity than other types of grouper (Syakirin et al, 2018; Rahmaningsih and Ari, 2016).

The main problem in cantang grouper cultivation is the relatively slow growth rate of fish over a certain period of time (Rahmaningsih & Ari, 2013). This condition is possible due to differences in changes in the amount, time, type, and content of feed given (Usman et al., 2010; Sutarmat & Yudha, 2013). High levels of feed protein requirements and slow digestive physiology are also thought to be the cause of the slow growth rate of grouper (Usman et al., 2010; Yamin et al., 2009).

Feed is the main key that must be controlled in grouper cultivation (Gusman and Cahyadi 2015). To get around the slow rate of grouper digestion of feed, it is very necessary to add alternative feed ingredients as a way of efficiency. One of the ingredients that can be used as a feed additive element is mangrove pedada fruit (Gusman and Cahyadi, 2015). Mangrove pedada fruit contains active compounds such as alkaloids, flavonoids, tannins and saponins (Niken, 2019). The results of previous studies also mentioned that mangrove pedada fruit is quite effective in increasing the growth of freshwater fish (Rajis et al, 2017; Gusman and Cahyadi, 2015).

Based on the background explanation above, the purpose of this study was to evaluate the digestibility of feed and growth of cantang grouper fed artificial feed with the addition of pedada mangrove fruit extract.

METHODS

The research was carried out on November 15 - December 15 2022 at the Brackish and Sea Water Laboratory, Faculty of Fisheries, Pekalongan University. The tools used included 12 aquariums measuring 40 x 25 x 25 cm, digital scales, DO meters, pH meters, refractometers, thermometers, scope nets, aeration kits, stationery, trays, spray bottles and a cell phone camera. The materials used in this study were cantang grouper, pedada mangrove fruit extract, brackish water, and pellet feed.

The study used a completely randomized design with four treatments and three replications. The feed dosage used refers to the research results by Herlina and Widaryati (2020). The treatment arrangement is as follows :

A : feed without the addition of pedada mangrove fruit extract
B : 5 ml/kg of pedada mangrove fruit extract
C : mangrove fruit extract 10 ml/kg of feed
D : 15 ml/kg of pedada mangrove fruit extract

Parameter Test

The indicators observed in this study included data on biomass growth rate, feed utilization efficiency (EPP), feed conversion ratio (FCR), survival rate (SR) and water quality.

Growth Rate

The growth of fish biomass is the difference in the total body weight of the fish at the end of rearing and the beginning of rearing which is calculated based on the formula introduced by Effendi, (1997) :

$$W = Wt - Wo$$

Explanation :
W : Growth of biomass (gr)
Wt : Biomass final research (gr)
Wo : Biomass early research (gr)

Survival Rate

The calculation of the survival rate or survival rate of fish is calculated based on the formula introduced by Effendi, (1997) :

$$\%SR = (Nt/No) \times 100\%$$

Explanation :
SR : survival rate (%)
Nt : number of fish at the end of rearing
No : number of fish at initial stocking

***Feed Conversion Ratio* (FCR)**

Feed Conversion Ratio is the ratio of the amount of feed given to the meat produced. According to Effendi, (1997), FCR can be calculated using the following formula:

$$FCR = F/(Wt-Wo)$$

Explanation :
F : The amount of feed given during the rearing period (kg)
Wt : Final biomass (kg)
Wo : Early biomass (kg)

Feeding Efficiency

Feeding efficiency can be calculated using the formula introduced by Afrianto and Liviawaty, (2005):

$$EPP = \frac{Wt\text{-}Wo}{F} \times 100\%$$

Keterangan :
EPP : Feeding efficiency
Wt : Fish weight at the end study (gr)
Wo : Fish weight at the start study (gr)
F : The amount of feed consumed (g)

Water Quality Parameters

Water quality parameters observed during the study were salinity, temperature, pH and salinity. Furthermore, the results of the research data were tested statistically using SPSS ver 19.0 software.

RESULT AND DISCUSSIONS

Growth Rate

Data on the average growth rate of cantang grouper reared during the study are presented in Table 1. Based on table 1, it can be seen that the growth of cantang grouper biomass has increased in each treatment. The best growth results were obtained in treatment D, with an average growth of 37.98 gr and the lowest growth was in treatment A with an average weight growth of 17.59 gr.

Table 1. Average growth of cantang grouper during rearing (gr)

Replicate	Treatment			
	A	B	C	D
1	17.74	29.22	34.49	37.64
2	17.13	30.83	32.04	39.51
3	17.91	28.16	33.34	36.79
Amount	52.78	88.21	99.87	113.94
Average	17.59	29.40	33.29	37.98
Stdev	± 0.41	± 1.34	± 1.23	± 1.39

Based on the results of the research in Table 1. it can be described that the addition of mangrove fruit extract has a very significant impact on increasing the metabolism of fish in consuming feed. The content of active compounds such as alkaloids, flavonoids, tannins, and saponins really helps the digestive system of fish (Niken et al, 2019). Alkaloid compounds in feed influence the digestive process of fish and increase appetite (Grandiosa, 2010). In addition, there are also flavonoid compounds that can act as antibacterial and speed up the digestion process of fish (Ghaliah and Quswa 2016).

The existence of a strong effect of giving mangrove pods to grouper feed was strengthened by the results of the analysis of variance which showed that there was a very significant effect of different feeding treatments on the growth of absolute biomass of cantang grouper (Table 2.). This means that statistically and correlatively, giving higher doses of mangrove extract will have a positive impact on increasing fish weight. The presence of active compounds such as saponins, alkaloids, flavonoids, tannins, and other mineral elements can act as immunostimulators in the immune and digestive systems of fish (Setiawan et al, 2019; Rosnizar et al, 2015; Manurung, 2019, Astiyani et al , 2022).

Table 2. Analysis of Variety

SK	DB	JK	KT	F test	Concentrations	
					5%	1%
Treatment	3	684.10	228.03	168.46**	4.06	7.59
Errors	8	10.83	1.35			
Amount	11	694.93				

***Feed Convertion Ratio* (FCR)**

Data for calculating the feed conversion ratio or FCR of cantang grouper during rearing are presented in Table 3. Based on the data obtained, the best FCR value of cantang grouper was obtained in treatment D with an FCR value of 1.10 and the lowest was treatment A (control) with a value of 1, 40. Feed Conversion Ratio (FCR) is a comparison between the amount of feed consumed and the increase in fish weight (Irawan et al., 2018).

Table 3. Feed conversion ratio of cantang grouper (%)

Replicate	Treatment			
	A	B	C	D
1.	1,47	1,24	1,13	1,11
2.	1,31	1,21	1,19	1,10
3.	1,42	1,25	1,16	1,10
Amount	4,20	3,71	3,47	3,31
Average	1,40	1,24	1,16	1,10
Stdev	±0,08	±0,02	±0,03	±0,01

From the data in Table 3, it can be stated that the greater the fish biomass, the greater the feed conversion value, meaning that the efficiency of feed utilization is getting better (Harahap et al, 2019). The FCR value in this study was considered better than the results of research by Hendriansyah et al, (2018) on groupers, which obtained a feed conversion value of 1.27. The feed conversion rate is also largely determined by the size and condition of the fish (Rachmawati et al, 2019).

The feed conversion value in the control treatment showed that the administration of this mangrove fruit extract was very efficient. The presence of compounds such as alkaloids, flavonoids, tannins which act as antioxidants and growth stimulators is considered quite effective in increasing the digestibility of fish (Sari et al, 2015; Choobkar et al, 2017; Arief, 2013; Grandiosa, 2010). Fish growth will be faster if the feed given can be digested properly so that the energy used becomes more optimal (Prihandini and Umami 2022).

Feed Efficiency

Data on the efficiency level of feed utilization from the results of this study can be seen in Table 4. Based on existing data, the best feed efficiency value was obtained from treatment D with a value of 90.69% and the lowest efficiency value was treatment A with a value of 71.64%. According to Henditama et al, (2015), high feed efficiency means that the food that enters the fish's body is properly utilized in the body and vice versa.

Table 4. Feed efficiency cantang grouper (%)

Replicate	Treatment			
	A	B	C	D
1.	68,18	80,52	88,39	90,11
2.	76,30	82,63	84,36	91,31
3.	70,43	79,68	86,51	90,66
Average	71,64	80,94	86,42	90,69
Stdev	±4,19	±1,52	±2,02	±0,60

The results of observations during the study showed a better average efficiency level of feed utilization than the results of research by Irawan et al, (2018), who obtained an feed efficiency value of 36.93. the presence of alkaloids, favonoids, tannins, saponins and several minerals plays an important role in increasing the efficiency of fish feed consumption (Grandiosa, 2010; Astiyani et al, 2022; Chilmawati, 2018). According to Linayati et al, (2022), flavonoids can act as an intake that supports the growth of various good bacteria, one of which is *Lactobacillus*.

Treatments C and B experienced a decrease in feed efficiency because the doses used were less so that feed efficiency was not optimal. The higher the dose and content of antioxidant compounds will play an important role in the efficiency of feed utilization (Rosnizar et al, 2015). In addition, fish performance conditions also affect digestibility capacity and effectiveness in consuming feed (Manurung, 2019).

Survival Rate

Survival rate of fish during the study period can be seen in Table 5. Based on Table 5. It can be explained that the treatment with mangrove fruit extract had an impact on the survival rate of fish compared to fish that were not given treatment (control). The average survival value of groupers ranges from 75-97% (Rachmawati et al, 2019).

Table 5. Survival Rate of cantang grouper (%)

Replicate	Treatment				Total
	A	B	C	D	
1	4	5	5	5	
2	5	5	5	5	
3	6	5	5	5	
Amount	14	15	15	15	59
Percentage	93%	100%	100%	100%	

The average passing grade from this study is better than the results from Gusman and Cahyadi's (2015) study, which obtained a passing grade of 80%. Fish factors such as genetic heredity, metabolic and physiological conditions and environmental conditions are the main indicators that support a high fish survival rate (Kurniawan, 2011). Good water quality conditions will have an impact on better fish survival rates (Windarto et al, 2019).

Poor water quality conditions will result in higher levels of fish stress and cause death (Made et al., 2017). In addition, proper

and appropriate feeding also affects the survival rate of groupers (Irawan et al, 2018). The condition of healthy fish makes the metabolic rate active and the stress level decreases, so that it will reduce the impact of decreasing the survival rate due to death (Ismi, 2020; Astiyani et al, 2022). Fish are a type of biota that is very responsive to changes in environmental conditions that affect their body condition (Linayati et al, 2021). This study literature is very description about pedada fruit to able for feed additive on aquaculture.

Water Quality

The results of water quality measurements during the study are presented in Table 6. Based on Table 6 data, it is known that the range of water quality parameters in all treatments is still within the proper range according to Firdaus et al, (2016), such as the water temperature during the study, which is between 28º - 30ºC, Water pH ranges from 7.9 – 8.3, salinity ranges from 30-33 ppt and DO ranges from 4.9 to 6.7 (Ariadi and Mujtahidah, 2022). Water is a living medium that affects the growth and survival of fish (Sulmartiwi et al, (2022). The value of water quality can be determined by measuring changes in physics, chemistry and biology (Rahayu, 2009; Ariadi et al, 2022).

Table 6. Water Quality

Parameters	Treatment				Standart*
	A	B	C	D	
DO (mg/L)	4.9-6.2	5.7-6.4	5.7-6.3	5.4-6.7	>4
Salinity (ppt)	30-33	30-33	30-33	30-33	30-34
Temperature (^{0}C)	28-30	28-30	28-30	28-30	27-32
pH	8.1	8.3	7.9	7.8	7.5-8.5

*Firdaus *et al*, (2016)

Fish survival at the end of the study was 93 - 100% which means that the water quality was quite good for the survival of cantang grouper. Decreasing water quality can result in disease and fish death (Linayati et al, 2022). The water quality parameters observed in this study include temperature, pH, and salinity, which are the main parameters in fish farming activities (Abdelrahman et al., 2019).

Overall, the treatment of pedada mangrove fruit extract gave very positive progress on the growth of cantang grouper. In addition, the treatment of giving mangrove fruit extract to the pedada also had a good effect on the parameters of fish survival. The level of treatment in aquaculture activities can be said to be effective if it can have a chain effect on other cultivation parameters (Ariadi et al, 2019). The impact of effective treatment will also have an influence on the level of cultivation productivity and the estimation of the carrying capacity of cultivation (Ariadi et al, 2021; Wafi and Ariadi, 2022).

CONCLUSIONS

The conclusion from the results of this study was that the addition of pedada mangrove fruit extract at different doses had a very significant effect on growth, feed efficiency and feed conversion rate for cantang grouper with the best dose of 15 ml/kg fee.

ACKNOLEDGEMENTS

The authors would like to thank the Department of Research and Community Service, Pekalongan University for the research funding.

REFERENCES

Abdelrahman H. A., Abebe A., Boyd C. E., 2019 Influence of Variation In Water Temperatureon Survival, Growth, and Yield of Pacific White Shrimp *Litopenaeus vannamei* InInland Ponds For Low-Salinity Culture. Aquaculture Research, Vol 50(2). Hlm 658-672. DOI:org/10.1111/are.13943.

Afrianto E dan Liviawaty E. 2005. Pakan Ikan. Kanasius. Yogyakarta. Badan Standardisasi Nasional (BSN). 1999. Produksi Benih Ikan Nila Hitam (*Oreochromis niloticus Bleeker*) Kelas Benih Sebar. SNI 7550:2009. 13 hlm.

Ariadi, H., Fadjar, M., Mahmudi, M. 2019. The relationships between water quality parameters and the growth rate of white shrimp (*Litopenaeus vannamei*) in intensive ponds. Aquaculture, Aquarium, Conservation & Legislation 12(6), 2103-2116.

Ariadi, H., Wafi, A., Madusari, B.D. 2021. Dinamika Oksigen Terlarut (Studi Kasus Pada Budidaya Udang). Penerbit ADAB. Indramayu.

Ariadi, H., dan Mujtahidah, T. 2022. Analisis Permodelan Dinamis Kelimpahan Bakteri Vibrio sp. Pada Budidaya Udang Vaname, *Litopenaeus vannamei*. Jurnal Riset Akuakultur 16(4), 255-262.

Ariadi, H., Madusari, B.D., Mardhiyana, D. 2022. analisis Pengaruh Daya Dukung Lingkungan Budidaya Terhadap Laju Pertumbuhan Udang Vaname (*L. vannamei*). EnviroScienteae 18(1), 29-37

Arief, M. 2013. Pemberian Probiotik yang Berbeda pada Pakan Komersil terhadap Pertumbuhan Retensi Protein dan Serat kasar pada IkanNila (*Oreochromis* sp.) Argoveteriner., 1(2): 88-93 hlm.

Astiyani, W. P., Akbarurrasyid, M., Prama, E. A., Iskandar, A., dan Kurniawan, G. P. 2022. "Pengaruh Dosis Ekstrak Daun Jeruju (*Acanthus Ilicifious*) Pada Pakan Terhadap Pertumbuhan Dan Sintasan Ikan Nila (*Oreochromis niloticus*)." *Journal of Marine Research* 11(1): 30–36. DOI:10.14710/jmr.v11i1.32334

Chilmawati, D.,Fronthea S., Ima w., dkk. 2018. Penggunaan Probiotik Guna Peningkatan Pertumbuhan, Efisiensi Pakan, Tingkat Kelulushidupan dan Nilai Nutrisi Ikan Bandeng *(Chanos chanos).* Saintek Perikanan. Vol.13 (2): 119-125. DOI: 10.14710/ijfst.13.2.119-125

Choobkar, N., Kakoolaki, S., Mohammadi, F. and Rezaeimanesh, M., 2017. The Effect of Dietary Propolis and Pollen Extracts on Prowth Performance and Haematological Responses of Rainbow Trout (*Onchorhynchus mykiss).* Iranian Journal of Aquatic Animal Health, 3(1), pp.16–25. DOI:10.18869/acadpub.ijaah.3.1.16

Effendie, M.I. 1997. Biologi Perikanan. Yayasan Pustaka Nusatantara. Bogor.

Firdaus, R. F., Lim, L. S., Kawamura, G., and Shapawi, R. (2016). Assessment on the Acceptability of Hybrid Grouper, *Epinephelus fuscoguttatus* ♀ × *Epinephelus lanceolatus* ♂ to Soybean Meal-based Diets. AACL Bioflux, 9(2): 284-290.

Ghaliah, R., dan Quswa, G. 2016. Pencegahan Infeksi *Aeromonas hydrophila* Pada Ikan Patin *(Pangasius* sp.*)* Menggunakan Tepung Paci-Paci *(Leucas lavandulaefolia)*. *4*(1), 40–52. DOI:10.36706/jari.v5i1.5823

Grandiosa R. 2010. Efektivitas Penggunaan Larutan Filtrat Jintan Hitam (*Nigella sativa*) Dengan Konsentrasi Berbeda Terhadap Pertumbuhan Bakteri *A. hydrophila* Secara In Vitro dan Uji Toksisitasnya Terhadap Ikan Mas (*Cyprinus carpio*). Laporan Penelitian Mandiri. Universitas Padjajaran. 16 hlm.

Gusman, E dan Cahyadi J. 2015. Pemanfaatan Buah Mangrove Pedada (*Sonneratia* sp) Sebagai Campuran Pakan Untuk Meningkatkan Pertumbuhan Ikan Mas. *Jurnal Harpodong Borneo* 8(2): 69–77. DOI:org/10.35334/harpodon.v8i2.124

Harahap, A. F., Rostika, R., Untung, M., Agung, K.,dan Padjadjaran, U. 2019. *Pemanfaatan Simplisia Pepaya Pada Ikan Rucah Untuk Pakan Kerapu Cantang (Epinephelus fuscoguttatus-lanceolatus) Di Keramba Jaring Apung Pesisir Pangandaran*. *X*(2), 56–64.

Henditama, M. A. A., dan Harini, M. 2015. Pengaruh Pemberian Pakan Berupa Campuran Pelet Ikan, Ulat Tepung (*Tenebrio molitor*), Dan Ganggang Merah (*Gracilaria foliifera*) Terhadap Pertumbuhandan Kelulushidupan Ikan Sidat (*Anguilla bicolor*). *Bioteknologi*, *12*(1), 22–28. DOI:10.13057/biotek/c120104

Hendriansyah, A., Putra, W. K. A., dan Miranti, S. 2018. Rasio Konversi Pakan Benih Ikan Kerapu Cantang (*Epinephelus fuscoguttatus x Epinephelus lanceolatus*) dengan pemberian Dosis Recombinant Growth Hormone (rGH) Yang Berbeda. *Intek Akuakultur*,*2*(2), 1–12. DOI:10.31629/intek.v2i2.525

Herlina, S., dan Rustiana W. 2020. "Evaluasi Pemberian Ekstrak Daun *Pluchea Indica* Less Pada Pakan Terhadap Pertumbuhan Benih Ikan Patin (*Pangasius Hypopthalamus*)." *Jurnal Ilmu Hewani Tropika (Journal of Tropical Animal Science)* 9(1): 13–16.

Irawan, H., Kusuma, W., dan Putra, A. 2018. Pengaruh Pemberian Hormon Tiroksin pada Pakan Pellet Megami terhadap Pertumbuhan Benih Ikan Kerapu Cantang *Epinephelus fuscoguttatus-lanceolatus* The Influence of Thyroxine Hormone on Megami Pellet Feed Against the Growth of *Epinephelus Fuscoguttatus-lanc*. *2*,33–48.

Ismi, S. 2020. Pengaruh Lama Waktu Yang Berbeda Pada Transportasi Benih Ikan Kerapu Sunu *Plectropomus Leopardus* Dengan Sistem Tertutup. *JFMR-Journal of Fisheries and Marine Research*, *4*(3), 339–344. DOI: 10.21776/ub.jfmr.2020.004.03.4

Kurniawan, O. 2011. Pengaruh Pemberian Hormon Tiroksin (T4) Dengan Perendaman Terhadap Pertumbuhan dan Kelulushidupan Benih Ikan Gurami (*Osphronemus gouramy Lac*). Jurusan Budidaya Perairan, Fakultas Pertanian. Universitas Riau. Hlm 40-48.

Linayati, L., Puji Astuti, R., Yusufi Mardiana, T., Bahrus Syakirin, M., Zulkham Yahya, M., dan Chintya Wijaya, M. (2022). Pemanfaatan Ekstrak Terung Asam Pada Pakan Buatan Terhadap Pertumbuhan Udang Vaname (*Litopenaeus Vannamei*). Jurnal Litbang Kota Pekalongan,*20*(1), 1–8. DOI:10.54911/litbang.v20i1.175

Linayati, L., Rizkyansyah, B., Mardiana, T. Y., and Yahya, M. Z. (2021). The Addition of HoneyBee to The Feed for Increase The Growth of White Snapper Seeds (*Lates calcarifer*). Journal of Aquaculture and Fish Health, *10*(3), 380. DOI:10.20473/jafh.v10i3.26944

Linayati, L., Syakirin, M. B., and Soeprapto, H. 2021. The Influence of Different Curcuma zanthorrhiza Dosage on The Growth and Survival Rate of Nile Tilapia (*Oreochromis niloticus*). Sains Akuakultur Tropis: Indonesian Journal of Tropical Aquaculture, Vol 5(2), Hlm 245-251. ejournal2.undip.ac.id/index.php/sat/index

Made. S, Fakhriyyah. S, dan Darawelalangi. A. 2017. Analisis Kontribusi Ekspor Ikan Kerapu (*Ephinephelus* sp.) Terhadap Pendapatan Asli Daerah (PAD) Provinsi Sulawesi Selatan. Journal of Economic and Social of Fisheries and Marine 4(2): 126-134.

Manurung, U. N. 2019. Pemanfaatan Kunyit (*Curcuma domestica Val*) Sebagai Imunostimulan pada Ikan Bawal (*Colossoma macropomum*). Budidaya Perairan. 7 (1). 21-25. DOI:10.35800/bdp.7.1.2019.24842

Niken, I. L. E. Putri, dan F. R. Gusti. 2019. Uji Senyawa Fitokimia Buah Pedada Merah (*Sonneratia caseolaris*) di Kawasan HutanMangrove Mangguang Kota Pariaman. Jurnal Kesehatan Saintika Meditory 1 (2): 44-49. DOI: 10.30633/jsm.v1i2.343

Paputungan Z, Wonggo D, dan Kaseger B.E. 2017. Uji Fitokimia Dan Aktivitas Antioksidan Buah Mangrove Sonneratia Alba Di Desa Nunuk Kecamatan Pinolosian Kabupaten Bolaang Mongondow Selatan Sulawesi Utara. *Media Teknol Has Perikan* 5(3):96. DOI:10.35800/mthp.5.3.2017.16866

Prihandini, A., dan Umami M. 2022. ”Pengaruh Penambahan Ekstrak Kunyit *(Curcuma domestica* Val.*)* Pada Pakan Terhadap Pertumbuhan Ikan Nila *(Oreo chromis niloticus)"* 22: 37–43.

Rachmawati, D., dan Prihanto, A.A. 2019. Effect of Papain Enzyme Supplementation on Growth Performance and Nutrient Utilization of Catfish (*Pangasius hypopthalmus*). Malaysian Applied Biology Journal, 48(5) : 1-10.

Rahayu, Iman., 2009. Praktis Belajar Kimia 1, Penerbit Departemen Pendidikan Nasional, Jakarta.

Rahmaningsih, S & A.I. Ari. 2013. Pakan dan pertumbuhan ikan kerapu cantang (Epinephellus fuscoguttatuslanceolatus). Ekologia. 13 (2) : 25-30

Rahmaningsih S., Ari AI, 2016. Pakan dan Pertumbuhan Ikan Kerapu Cantang (*Epinephellus fuscoguttatus-lanceolatus*). Jurnal Ekologi. Jurnal Ilmiah Sains Dasar dan Lingkungan, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Pakuan. 13(2):25-30.

Rajis, Desmelati, dan Tjipto Leksono. 2017. “Pemanfaatan Buah Mangrove Pedada (*Sonneratia* sp.) Sebagai Pembuatan Sirup Terhadap Penerimaan Konsumen Utilization of Pedada Fruit (*Sonneratia caseolaris*) of Mangrove for Syrup Production towards Costumer Acceptance.” *Jurnal Perikanan Dan Kelautan* 22(1): 50–51. DOI: http: 10.31258/jpk.22.1.51-50

Rosnizar, K Eriani, I M Ramli, and F Muliani. 2015. "Uji Efek Imunostimulan Buah Kurma (*Phoenix dactylfera*) Pada Mencit Jantan." *Prosiding Seminar Nasional Biotik*: 292–97. DOI: 10.22373/pbio.v3i1.2703

Sari D.I, Annisa H.Y, Rizka A.A, Ulfa I, dan Endang D. 2015. Peningkatan Sistem Imun Oleh Kombinasi Ekstrak Etanol Daun Awar-Awar(*Ficus septica burm. F*) dan Ekstrak Etanol Daun Kelor (*Morinaga oleifera*) Sebagai Kokemoterapi Kanker Pada Tikus Putih Betina Galur Sprague Dawley Yang Diinduksi Doksorubisin. Pharmaciana, 5(2): 147-152 DOI: 10.12928/pharmaciana.v5i2.2145

Setiawan, Eka Agus, Ary N Susatyo, dan Praptining Rahayu. 2019. "Pengaruh Ekstrak Daun Ketapang (*Terminalia catappa*) Terhadap Pertumbuhan Ikan Gurami (*Osphronemus gouramy* Lac.*)* Pada Sistem Akuakultur." *Prosiding Seminar Nasional, Sains dan Entrerpreneurship VI*: 1–7.

Sulmartiwi, L., Eka, B., Satia, N., and Shohifah, I. U. (2022). Correlation of Density and Water Quality to Cortisol of Cantang Grouper Fish *(Epinephelus fuscoguttatus X Epinephelus lanceolatus)* in Floating Net Cages. *11*(2), 402–411.

Syakirin, M. B., Anggoro, S., Prayitno, S. B., & Saputra, S. W. (2018). Effects of the Salinity Media on the Osmotic Work Level, Feed Utilization Efficiency and the Growth of "cantang" hybrid grouper *Epinephelus fuscoguttatus x E. Lanceolatus.* AACL Bioflux, 11(4), 1274–1279.

Wafi, A., dan Ariadi, H. 2022. Estimasi Daya Listrik Untuk Produksi Oksigen Oleh Kincir Air Selama Periode "*Blind Feeding*" Budidaya Udang Vaname (*Litopenaeus vannamei*). Saintek Perikanan: Indonesian Journal of Fisheries Science and Technology 18(1), 19-35.

Windarto, S., Hastuti, S., Subandiyono, Nugroho, R.A. dan Sarjito, 2019. Performa pertumbuhan ikan kakap putih (*Lates calcarifer* Bloch, 1790) yang dibudidayakan dengan sistem keramba jaring apung (KJA). Jurnal Sains Akuakultur Tropis, 3(1), pp.56–60. DOI:10.1471 0/sat.v3i1.4195

Sutarmat, T & H.T. Yudha. 2013. Analisis keragaan pertumbuhan benih kerapu hibrida hasil hibridisasi kerapu macan (Epinephelus fuscoguttatus) dengan kerapu kertang (Epinephelus lanceolatus) dan kerapu batik (Epinephelus microdon). Jurnal Riset Akuakultur. 8 (3) : 363-371

Usman., N.N. Palinggi, Kamaruddin, Makmur & Rachmansyah. 2010. Pengaruh kadar protein dan lemak pakan terhadap pertumbuhan dan komposisi badan ikan kerapu macan, Epinephelus fuscoguttatus. Jurnal Riset Akuakultur. 5 (2) : 277-286.

Yamin, M., N.N. Palinggi & Rachmansyah. 2009. Aktivitas enzim dalam lambung dan usus ikan kerapu macan setelah pemberian pakan. Media Akuakultur. 3 (1) : 40-44.

10% Overall Similarity

Top sources found in the following databases:

- 10% Publications database
- Crossref database
- Crossref Posted Content database

TOP SOURCES

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

1	L Linayati, M Nailal Khoiri, T Yusufi Mardiana, M Zulkham Yahya. "Effec... Crossref	1%
2	Istiyanto Samidjan, Safar Dody, Diana Rachmawati. " Technology engin... Crossref	1%
3	A D A Shofiya, Pinandoyo, S Windarto, V E Herawati. "The effect of thic... Crossref	<1%
4	Juita Sihombing, Nanda Riskyana, Benny Diah Madusari, M. Zulkham Y... Crossref	<1%
5	H Ariadi, M. B Syakirin, S Hidayati, B D. Madusari, H Soeprapto. "Fluctu... Crossref	<1%
6	W Suryaningsih, R Maulana, I Istiqomah, A Isnansetyo. "In vitro adhesio... Crossref	<1%
7	Ardiansyah, Achmad Rizal. "Effect of Additional Extract Curcuma (Curc... Crossref	<1%
8	Ricky F Simanjuntak, Supardi Husni, Jimmy Cahyadi. "Bioenrichment of... Crossref	<1%
9	"The impact of water quality on the availability of phytoplankton and gr... Crossref	<1%

10	Afra Nur Faridah, Yulfiperius Yulfiperius, Andriyeni Andriyeni. "PENGAR... Crossref	<1%
11	Ayja Khayrurraja, Roffi Grandiosa, Fittrie Meyllianawaty Pratiwy, Iskand... Crossref	<1%
12	D F Putra, M Muhsinah, I I Arisa. "The Substitution of soybean meal by ... Crossref	<1%
13	Baedlowi Baedlowi, Aminin Aminin. "PENGARUH PEMBERIAN PROBIO... Crossref	<1%
14	F. Feliatra, U. M. Batubara, I. Lukistyowaty, T. Emelson. "The Addition o... Crossref	<1%
15	I I Arisa, Z Zulfikar, M Muhammadar, N Nurfadillah, S Mellisa. " Study o... Crossref	<1%
16	P W Ratrinia, Sumartini, N E Hasibuan. "The effect of addition dfferent ... Crossref	<1%
17	Sekar Indraswari, Ratih Kurniasari, Al Mukhlas Fikri. "Karakteristik Orga... Crossref	<1%
18	Herlinah, Sulaeman, Gunarto, A Parenrengi, Rosmiati. "Effect of water... Crossref	<1%
19	K S Harahap, Sumartini, S A Ikhsan. "Potential various mangrove fruit ... Crossref	<1%
20	Shiyou Chen, Sahya Maulu, Jie Wang, Xiaoze Xie, Xiaofang Liang, Hao ... Crossref	<1%
21	Yuli Andriani, Taufik Ikhsan Kamil, Irfan Zidni, Iskandar ., Titin Herawati... Crossref	<1%