Original Research Article

INCREASING THE NUTRITIONAL VALUE OF FISH FEED WITH THE ADDITION OF ECO ENZYME

ABSTRACT

Feed is one of the determinants of the success of cultivation activities. The nutritional and protein content of commercial feed has been determined, however, the protein content in the feed can still be increased. Eco enzyme is the result of fermentation from a mixture of sugar, organic fruit or vegetable residue, and water by utilizing probiotic activity which produces enzymes from organic waste.The purpose of this study was to analyze the increase in the nutritional value of fish feed with the addition of eco enzyme. Analysis of feed samples was carried out at the Laboratory of Nutrition and Animal Feed Science, Faculty of Agriculture, LambungMangkurat University, South Kalimantan. The treatment given was the addition of eco enzyme at different doses with the treatment of feed A (20 mL/kg feed), B feed (40 mL/kg feed), and C feed (60 mL/kg feed). The organic ingredients used to make Eco Enzyme are fruit peels sourced from mini markets and salad traders in the area around Banjarbaru City. The results of the chemical feed analysis test (proximate) which include: water content, ash content, protein content, fat content and fiber content. ased on the results of the analysis of feed samples with the addition of 60 mL/kg of feed eco enzyme, the value of the protein content can increase by 117.4% from 15% protein content to 32.71%. It contains a fat content value of 3.33% which is close to the SNI requirements for fish feed quality and reduces 69.6% of the fiber content of feed from 10% to 3.04%.%.

Keywords: nutrition, fish feed, proximate, eco enzyme

1. INTRODUCTION

Aquaculture has shown rapid development, both in fresh water, brackish water and sea water fisheries. Catfish farming business is very dependent on the rapid growth of fish and large weight so that they can be harvested immediately. The problem that occurs in fish farming in general is in the feed. Feed is one of the determinants of the success of aquaculture activities. Commercial feed used as fish feed is still an imported product whose price is relatively expensive. The high price of high-protein feed raw materials causes high feed prices among cultivating communities (Afrianto and Liviawaty, 2005). The selling price of commercial catfish feed with 31-33% protein in Banjarbaru ranges from IDR 14,000 – IDR 18,000 per kilogram. The selling price of commercial catfish feed with 13 – 15% protein ranges from IDR 10,000 – IDR 12,000 per kilogram. The significant difference between high protein feed and lower protein feed can be seen in the range of fish feed prices.

The nutritional and protein content of commercial feed has been determined, but the protein content in the feed can still be increased. One of the alternatives that can be done to increase the crude protein content is with enzymes. Enzymes are biocatalyststhatspeedupreactions in breakingdowncomplexchemicalsubstancesintosimplerones (Bhowmick, 2016).

Eco Enzymeis a mixtureofmicroorganismscontainingvariousenzymesthatcanhelpbreakdownorganicmatterandimprovedigestion in fish. Theseenzymesincludetheenzymesamylase, protease, lipase, cellulase, andothers, whichplay a role in breakingdowncarbohydrates, proteins, fats, and fiber in fishfeed. The useof Eco Enzyme in fishfeed has severalbenefits (Sahu, 2018). First, theseenzymeshelpincreasetheavailabilityofnutrients in thefeedbybreakingdowncomplexmoleculesintosimplerformsthatfishcandigestand absorb moreefficiently. Thiscontributestoincreasedfeedefficiencyandfish growth. In addition, Eco Enzymecanalsohelpimprovethequalityoffeedbyacceleratingthedecompositionoforganicmatterand reducingmicrobialcontamination in feed. Thiscanreducediseaseriskandimprovewaterquality in culturesystems (Nengsih, 2020).

Eco enzyme is the result of fermentation from a mixture of sugar, organic fruit or vegetable residue, and water by utilizing probiotic activity which produces enzymes from organic waste. Eco enzymes are formed from facultative anaerobic fermentation or fermentation

processes that occur with or without the need for oxygen. Bacteria that grow in the manufacture of eco enzymes are lactic acid bacteria which convert oxygen into hydrogen peroxide compounds. The fermentation process begins when the microbes that live in the remaining organic matter process sugar as an energy source and produce various natural enzymes (Andhika, 2022). Eco enzymes contain secondary metabolites such as flavonoids, quinones, saponins, alkaloids, and cardioglycosides. Functional enzymes contained in eco enzymes such as amylase, lipase, caseinase, protease, and cellulase. (Vama & Cherekar, 2020). The activity of metabolic enzymes in fish can increase the levels of metabolites in the blood so that the fish will quickly get hungry, resulting in an increase in appetite and consumption of fish feed which will result in growth. Eco enzymes can be used in fish feed mixtures, for enlarging or increasing fish growth. Adding enzymes can improve gut structure and growth performance in catfish larvae (Cahyadi, 2020).

Increasing the content of feed ingredients can be done by chemical feed testing or also called proximate analysis. Parameters for testing this material include moisture content, protein content, fat content, crude fiber content, ash content. The results of this analysis are very important and very useful in the formulation and quality of the resulting feed. Good quality artificial feed must meet several criteria, namely the nutritional content of feed, especially protein, must be in accordance with the needs of fish, the nutritional content of feed is easily absorbed by the body, low ash content and high effectiveness.

The purpose of this study was to analyze the increase in the nutritional value of fish feed by adding eco enzyme at different doses.

2. RESEARCH METHOD

2.1. Tools and materials

The tools and materials used in this research can be seen in Table 1 and Table2.

Table 1. Tool type , Quantity And to use Tool

No	Tool	Amount	Utility
1.	Book	1 piece	Record observations
2.	Label	1 Pack	Give a sign
3 .	Tray	3 pieces	Laying Feed
4 .	Plastic	1 Pack	Feed packaging
5 .	Fountain pen	2 pieces	Record observations
6 .	Sprayer	4 pieces	Spray Liquid
7.	Scales	2 pieces	Weigh fish and feed

Table 2. Types of materials , quantities and uses of materials

No	Material	Amount	Utility
1.	*Eco-enzyme* liquid	120ml	Additional supplements
2.	FeedCommercial	50g	Fish feed
3.	Alcohol	100mL	Antiseptic

2. 2. Experimental design

This research is an experimental research using 3 treatments. The treatment used refers to Henrieta's research (2022) by giving different doses of Eco Enzyme to the following commercial feeds:
Feed Sample A = Commercial feed with the addition of eco enzyme (20 mL/kg feed)
Feed Sample B = Commercial feed with the addition of eco enzyme (20 mL/kg feed)
Feed Sample C = Commercial feed with the addition of eco enzyme (20 mL/kg feed)

2.3. Research procedure

a. Material Preparation

The commercial feed used was obtained from animal feed shops in Banjarbaru City. Eco enzyme liquid comes from the Eco enzyme Community of South Kalimantan. The method for making Eco Enzyme is with a ratio of water : organic matter : molasses (brown sugar) of 10 : 3 : 1. The organic material used by the Eco Enzyme community is in the form of fruit skins sourced from mini markets and salad traders in the area around Banjarbaru City. Organic materials weighing 36 kg, molasses (brown sugar) as much as 12 kg and 120 liters of water are put into a large drum (diameter 49 cm and height 100 cm with a capacity of 200 liters of water) then tightly closed. The mixed material is fermented with a fermentation time of 3 months.

After 3 months of fermentation, the Eco enzyme liquid is ready to be used for application to feed. The liquid from inside the drum is taken using a hose and then put into the sprayer and is ready for use.

a. Preparation of the Test Feed

1. The tool that will be used first is sprayed with alcohol for antiseptic purposes. Commercial feed was weighed as much as 10 g for each treatment. The feed is sprayed with Eco Enzyme liquid which has been prepared in a sprayer container (it is known that once the sprayer is sprayed, 0.1 mL of liquid can be released). The Eco enzyme liquid used is pure liquid without the addition of water. Eco enzyme is sprayed according to the dosage of liquid that has been determined in each treatment container, namely 20 mL/kg feed, 40 mL/kg feed, 60 mL/kg feed.
2. The feed that has been sprayed evenly is then air-dried for 3 hours.
3. The feed from each treatment was put into plastic and ready to be tested chemically (proximate) at the Laboratory of Nutrition and Animal Feed Sciences, Faculty of Agriculture, University of Lambung Mangkurat, South Kalimantan .

2.4. Feed Chemical Test Parameters (Proximate) observed

Chemical feed nutrition test is the determination of the quality of nutrients in feed. The test parameters observed are presented in Table 3.

Table 3. Test parameters proximate

No.	Parameter	Unit	Method
1.	Water content	%	G ravimetry
2.	Ash Content	%	G ravimetry
3.	Protein Content	%	Kjeldhal
4.	Fat level	%	G ravimetry
5.	Crude Fiber Content	%	G ravimetry

Source: Lab Handbook. Animal Feed and Nutrition Science, Faculty of Agriculture, University of Lambung Mangkurat

2. 5. Data analysis

Obtained data from the results of this test were analyzed by the method Statistical analysis of the T test (Test T) and descriptive analysis. Statistical analysis T test (Test - T) is a T-test is a statistical method used to test whether there is a significant difference between two groups or populations. Descriptive analysis is statistics used to analyze data by describing data as it is without intending to make general conclusions or generalizations.

3. RESULTS AND DISCUSSION

3.1. Results

The results of the research regarding the addition of Eco enzyme liquid to fish feed, include data from the results of feed chemical analysis tests which include: moisture content, ash content, protein content, fat content and fiber content

Data onfeedchemical test results with the additionofdifferentEco enzymesdifferentonfeedwiththestatisticalanalysisofthe T test (Test T) presented in Table 4. and Figure 1. Following:

Table 4. Resultsoffeedchemicalanalysis (moisturecontent, ashcontent, protein content, fatcontentand fiber content

Code Sample	AnalysisParameters				
	Rate Water (%)	Ash Content (%)	Protein Content (%)	Fat level (%)	Fiber Content (%)
ControlFeed	12 [a]	10 [a.m]	15 [a]	4 [a]	10 [a.m]
Feed A (20 mL/kg)	11.71	7,87	30,67	3,33	3,25
Feed B (40 mL/kg)	12.30	7,92	31,23	3,24	3,11
Feed C (60 mL/kg)	12.52	7,94	32,61	2.89	3.04

Note: differentletters in thesamecolumnindicatesignificantlydifferentresults

Basedontheresults of chemical analysis of feed (moisture content, ash content, protein content, fat content and fiber content) with addition fluid Different *eco* enzymes on feed diagram as shown in Figure 1.

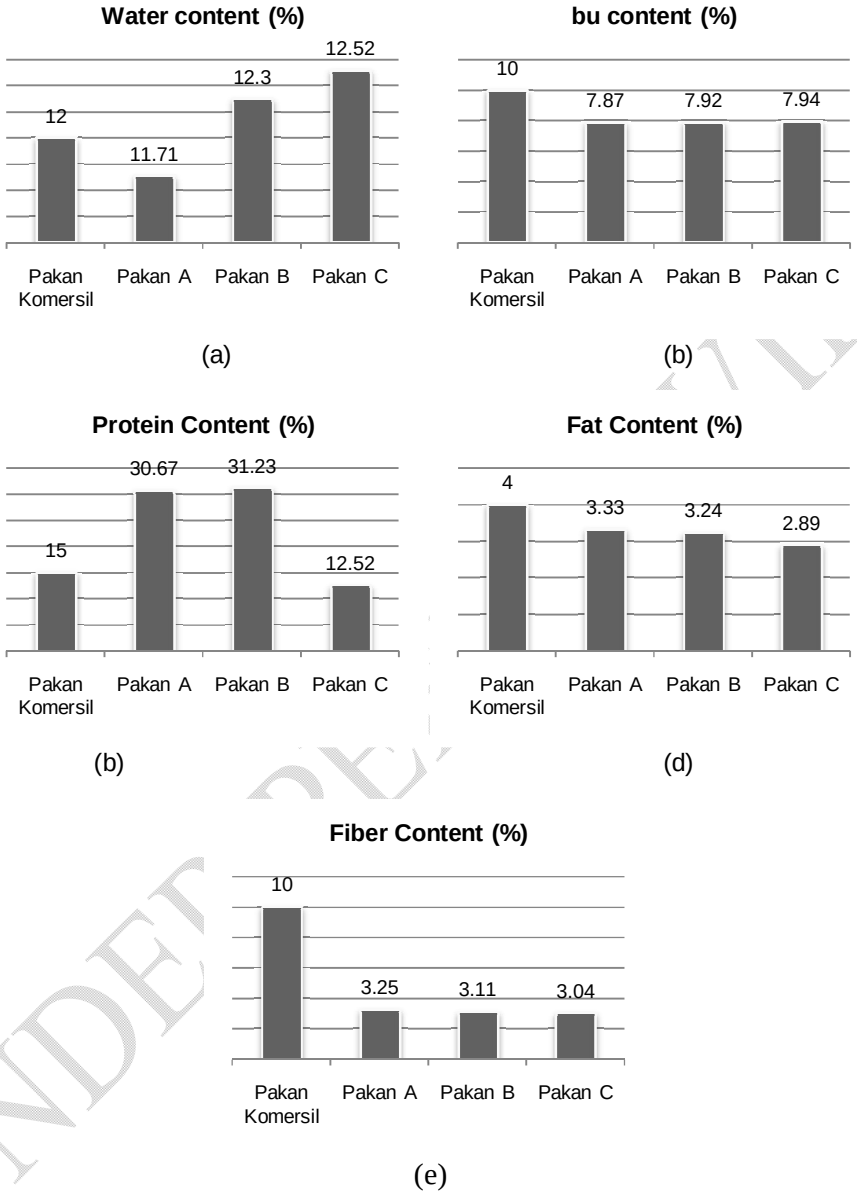

Figure 1. Chemical analysis of feed (a) moisture content, (b) ash content, (c) protein content, (d) fat content and (e) fiber content

3.2. Discussion

a. Water content

The water content in commercial feed is 12% and feed with added eco enzyme ranges from 11.71-12.52%. Compared to the SNI quality requirements for fish feed, the maximum water content in the feed ingredients is 12%.Moisturecontent in thefeedwithouttheadditionof eco enzyme (beginning) andwiththeadditionof eco enzyme (final) Basedonthestatisticalanalysisofthe T test, theresultsobtained were t count (-3.727) < t table (4.302), meaningthattherewasnosignificantdifference.

The highest water content was in feed sample C with the addition of 60 mL/kg of feed eco enzyme fluid, which was 12.52%. This high water content is thought to have occurred due to the spraying of eco enzyme liquid which was

added to the feed which seeped into the feed. The water content of 12.52% is still within the tolerance limit for fish feed. Compared with the results of Henrieta's proximate analysis (2022), it shows that the water content with the addition of 60 mL/kg feed eco enzyme liquid is 13.075%. The moisture content in good fish feed generally ranges from 70-90% of the wet weight (Mujiman, 2000).

The amount of water in a feed ingredient will be very influential, if the excessive water content can make the feed ingredient not durable and make it easier for spoilage microbes to damage it. The water content in feed ingredients can affect the quality of feed ingredients, good feed ingredients have a little water content. Moisture content affects the durability of the pellets in the feed, the results of a study by Hutagalung et al (2021) showed that pellets with a water content of 13% are more resistant to the water surface. The durability of pellets in water determines the physical quality of feed. The longer the feed can last in water, the better the physical quality of the feed (Patadjai 2011).

The best results for water content were treatment of feed A with the addition of 20 mL/kg of feed eco enzyme liquid with a water content value of 11.71% and met the requirements of SNI for fish feed quality. This water content value indicates that there is a decrease of 2.4% compared to commercial feed.

b.Ash Content

The ash content in the commercial feed is 10% and the ash content in the feed with the addition of eco enzyme ranges from 7.87-7.94%. The SNI requirement for the quality of artificial fish feed for the maximum ash content in the feed ingredients is 13%. All the results of the analysis of the ash content of the feed samples showed good results because they were below the maximum limit.The ashcontent in thefeedwithouttheadditionof eco enzyme (initial) andwiththeadditionof eco enzyme (final) basedonthestatisticalanalysisofthe T testobtainedtheresultsof t count (20 6.9) > t table (4.302), meaningsignificantlydifferent.

Feed samples with the addition of eco enzyme liquid showed a decrease in the value of the content compared to the value of the ash content of commercial feed (control). Spraying eco enzyme liquid in feed samples can reduce the ash content in the feed thereby increasing the quality of the fish feed content.

Ash in feed includes inorganic components that cannot be consumed. In fish feed, ash is contained in the ingredients. Ash affects the digestibility of fish and fish growth (Setyono, 2012). Ash content is very important for fish feed because it can affect the growth of fish scales (Sutikno, 2011). Excessive ash content will have a negative effect because it can reduce fish appetite and disrupt the balance and absorption of other minerals. Meanwhile, a lack of ash content will disrupt the body's metabolic processes, inhibit bone growth, and interfere with muscle work (Irawati, 2008).

The best results for ash content were feed sample A with the addition of 20 mL/kg feed eco enzyme liquid, because it contains an ash content of 7.87% and still meets the SNI requirements for fish feed quality. The value of the ash content of this feed treatment showed that there was a decrease of 21.3% compared to commercial feed.

c. Protein Content

Protein content in commercial feed is 15% and protein content in feed with the addition of eco enzyme liquid ranges from 30.67-32.61%. The SNI requirement for fish-made feed quality for protein content in feed ingredients is 25-45%.Protein content in thefeedwithouttheadditionof eco enzyme (beginning) andwiththeadditionof eco enzyme (final) Basedonthestatisticalanalysisofthe T test, theresultsobtained were t count (24.521) > t table (4.302), meaningthatitwassignificantlydifferent. Feed with the addition of eco enzyme liquid shows good results because it is above the minimum limit of SNI for fish feed. Whereas in commercial feed without treatment, the protein content is still below the SNI quality requirements.

The addition of eco enzyme liquid in this study has been shown to increase the protein content in fish feed. This is presumably due to the eco enzyme liquid which is sourced from the basic ingredients of fruit peels, one of which is papaya and pineapple peels. As we know that papaya and pineapple peels contain the enzyme papain. According to Khati et al. (2015), the papain enzyme is a protease enzyme that hydrolyzes protein, which is a key factor for increasing protein digestibility andabsorption, whichultimatelyaffectsfishgrowth.

Reducingfeedwastebyusing Eco Enzymecanhelpfishdigestandusethenutrients in feedmoreefficiently, reducingtheamountoffeedwastethatisdischargedintotheenvironment. Thiscanhavesignificantenvironmentalbenefits in fish farming (Murthy, 2015).

The more enzymes added to the feed, the more protein will be hydrolyzed into amino acids, thereby increasing the growth and digestibility of fish for feed. The protein content does not meet the protein requirements of the feed, so growth

will be slow. Symptoms of amino acid deficiency can be seen from slow growth, decreased consumption or decreased size (Amalia et al, 2013).

The best result is feed sample C with the addition of 60 mL/kg feed eco enzyme liquid because it can increase the protein content of 117.4% from the 15% protein content of commercial feed (Control) which increases to 32.61% and meets the SNI requirements for fish feed quality.

d. Fat Content

The fat content in commercial feed is 4% and the fat content in feed with the addition of Eco Enzyme Liquid ranges from 2.89-3.33%. The SNI requirement for the quality of fish-made feed for the fat content in the feed is 4-8%.The fat content in the feed without the addition of eco enzyme (initial) and with the addition of eco enzyme (final) based on the statistical analysis of the T test obtained the results of t count (5.342) > t table (4.302), meaning that it was significantly different.

The results of the proximate analysis of fat content in the feed sample showed that the value was below SNI but still good in fish feed. According to Iskandar (2017) good feed generally contains at least 4-18%, optimal fat content in supporting fish growth is 2.57%. This is also in accordance with the opinion of Mudjiman (2004), that the ideal fat content for fish feed ranges from 4-18% and if the fat content is high, it must require a good storage process, otherwise it will cause rancidity to occur which can damage the nutrients contained. on fish feed. Fat in the feed affects the taste and texture of the feed. Fat content is needed in food ingredients because it can be a source of energy besides carbohydrates and proteins.

The best result for the value of fat content is feed sample C with the addition of 60 mL/kg of feed eco enzyme liquid because the value of 3.33% fat content is close to the value of the SNI requirement for quality fish feed 4%.

e.Fiber Content

The fiber content in commercial feed is 10% and the fiber content in feed with the addition of eco enzyme liquid ranges from 3.04-3.25%. The SNI requirement for fish-made feed quality for fiber content in feed is a maximum of 6-8%.The fiber content in the feed without the addition of eco enzyme (initial) and with the addition of eco enzyme (final) based on the statistical analysis of the T test obtained the results of t count (26.428) > t table (4.302), meaning significantly different.

Crude fiber levels should not exceed the standard, excess levels of crude fiber will result in decreased feed intake considering that crude fiber cannot be digested by the body. Coarse fiber has no nutritional value and functions to facilitate the digestive process. Spraying eco enzyme liquid in this study was able to reduce the fiber content in fish feed compared to commercial feed, which originally had a value of 10% fiber content. The decrease in crude fiber content is due to the enzymes in this eco enzyme liquid which contain cellulase enzymes which will convert crude fiber (cellulose) into simpler molecules. This agrees with Ikram (2005), that cellulase enzymes are a multienzyme system consisting of three components, namely endoglucanase, which decomposes cellulose polymers randomly to produce oligodextrins with varying chain lengths, exogglucanase which decomposes crude fiber (cellulose) from the reducing end and non-reducing to produce short-chain cellulose or cellobiose, and β-glucosidase which breaks down cellobiose to produce glucose.

Coarse fiber is needed to facilitate excretion of feces. Too much crude fiber > 10% results in decreased digestibility, increased metabolic waste, and reduced water quality (Iskandar, 2017).

The result of the best fiber content value is feed sample C with the addition of 60 mL/kg feed eco enzyme liquid, with a content value of 3.04% and in accordance with the requirements of SNI fish feed quality. The value of this feed treatment shows that there was a decrease of 69.6% compared to commercial feed.Khan (2017) the effectofadding Eco Enzymeon fiber content in fishfeedcanvarydependingonthetypeoffeedused, thetypeofenzymeadded, thedoseofenzyme, andthespeciesoffishbeingcultivated.

4. CONCLUSION

Based on the results of feed sample analysis with the addition of 60 mL/kg of feed eco enzyme, the protein content value increased by 117.4% from 15% protein content to 32.71%. Contains a fat content value of 3.33% which is close to the SNI requirements for fish feed quality and reduces 69.6% content of feed fiber content from 10% to 3.04%.

REFERENCES

1. Afrianto, E and E. Liviawati. 2005. *Fish Feed* . Canisius. Yogyakarta
2. Amalia, R., Subandiyono, E. Arini. 2013. The effect of papain on dietary protein utility and growth of African catfish Journal Aquaculture Management and Technology, 2(1): 136- 143.
3. Andhika S..2022. *eco enzyme* , from

organic waste to a multifunctional solution. Made for minds
4. Bhowmick, S., Paul, B. N., Mondal, S., &Pramanik, P. (2016). Eco-EnzymeSupplementation in Fish Diets: A Review. JournalofFisheriesandAquaticScience, 11(1), 1-9.
5. BSN, 2000. SNI 01-6485.3-2000 Production of Gourami (*Osphronemus goramy* , Lac) Seed Class for Spreading Seeds. National Standardization Body, Jakarta .
6. BSN, 2002. SNI 01-6483.5-2002 Siamese catfish (Pangasius hypophthalmus) Section 5: Production of Growing Class in Ponds. National Standardization Body, Jakarta.
7. BSN, 2006. SNI 01- 4087-2006 Artificial Feed for Dumbo Catfish (*Clarias gariepinus* x *C.fuscus*) in Intensive Aquaculture. National Standardization Body, Jakarta.
8. BSN, 2006. SNI 01-4266-2006 Artificial Feed for Goldfish (*Cyprinus carpio Linneaus*) in Intensive Aquaculture. National Standardization Body, Jakarta.
9. BSN, 2006. SNI 01-4266-2006 Artificial Feed for Goldfish (*Cyprinus carpio Linneaus*) in Intensive Aquaculture. National Standardization Body, Jakarta.
10. BSN, 2006. SNI 01-4413-2006 Artificial Feed for Eels (*Anguilla*spp) in Intensive Aquaculture. National Standardization Body, Jakarta.
11. BSN, 2006. SNI 01-7242-2006 Artificial Feed for Tilapia (*Oreochromis*spp) in Intensive Aquaculture. National Standardization Body, Jakarta.
12. Cahyadi, Ucu., D. Jusadi., Ahmad, I. F and Sunarma, A. 2020. The role of adding enzymes to artificial feed on the growth of African catfish larvae (*Clarias gariepinus Burchell* , 1822).*Indonesian Journal of Ichthyology* 20(2): 155-169 DOI: https://doi.org/10.32491/jii.v20i2.522
13. Henrietta ,L. _ P. _ S.P. , _ *et al.* Eco-Enzyme Supplementation in the Fish Commercial Feed on Growth Performance of Nile Tilapia (*Oreochromis niloticus*) .2022.*Sch J Agric Vet Sci* .9(5): 60-64
14. https://www.dw.com/id/eco-enzyme-dari-waste-organik-jadi-solute-multifunction/a-62241229. Accessed 26 February 2023
15. Hutagalung, Rory Anthony., *et al.* The characteristics of pellets buoyancy and durability from Aquaponic biofloc waste. 2021. Journal of Fisheries and Marine Technology Vol. 12 No. 1
16. Ikram-ul-haq, MM Javed, TS Khan and Z. Siddiq. 2005. Cotton Saccharifying Activity of Cellulases Produced by Co-culture of Aspergillus niger and Trichoderma viride. Res. J. Agric & Biol. sci. 1(3):241-245.
17. Irawati, D., D. Rachmawati and Pinandoyo. 2015. Growth Performance of Black Tilapia (*Oreochromis niloticus Bleeker*) Seeds through the Addition of Papain Enzyme in Artificial Feed. *Journal of Aquaculture Management and Technology* , 4(1): 1-9.
18. Iskndar, R., Elrifadah., 2015. Growth and Feed Efficiency of Tilapia (Oeochromis niloticus) Fed Artificial Kiambang-Based Feed. Ziraa'ah Vol 40. No. 1 February 2015
19. Khan, M. F., Islam, M. S., Rahman, M. A., Hasan, M. R., & Haque, A. (2017). Effectsof eco-enzyme (bacteria) ongrowth, feedconversionratioandcostbenefitanalysisof mono-sex tilapia (Oreochromisniloticus) culture. Journalofthe Bangladesh AgriculturalUniversity, 15(3), 318-324.
20. Khati, A., Danish, M., Mehta, KS & Pandey, N. 2015. Estimation of Growth Parameters in Fingerlings of Labeo rohita (Hamilton, 1822) Fed with Exogenous Nutrizyme in Tarai Region of Uttarakhand, India. African Journal of Agricultural Research. 10(30):3000-3007. DOI: 10.5897/AJAR2015.9729
21. Mudjiman, A. 2004. *Fish Food* . Independent Spreader, Jakarta
22. Mujiman, A. 2000. Fish Food. Independent Spreader Publisher, Jakarta. 90 p
23. Murthy, C. K., Krishna, G., Sahu, N. P., Pal, A. K., &Prusty, A. K. (2015). Effectsofdietarysupplementationof eco-friendlyenzymeongrowth, nutrientutilization, and protein synthesis in Labeorohitafingerlings. Aquaculture International, 23(5), 1225-1237.
24. Nengsih, E. R., Herawati, V., &Widanarni. (2020). The Effectof Eco EnzymeAdditionontheGrowth Performance andFeedEfficiencyofCommonCarp (Cyprinuscarpio) Fry. AquaticScienceand Technology Journal, 8(1), 27-34.
25. Patadjai AB. 2011. Quality Analysis of Abalone Meat (*Haliotis asinina*) Fed Formulated and Natural Feed [Dissertation]. Makassar: Hasanuddin University.
26. Sahu, S. K., Sahoo, P. K., Meher, P. K., & Swain, P. (2018). EcofriendlyFeedAdditivesforAquaculturePractices: A Review. JournalofEntomologyandZoologyStudies, 6(4), 1142-1147.
27. Setyono, B. 2012. Making Artificial Feed. Freshwater Management Unit. Kepanjen. Poor.
28. Sutikno, E. 2011. Making Milkfish Artificial Feed. Directorate General of Aquaculture

Fisheries Center for Development of Brackish Water Cultivation. Jepara.
29. Vama, L., & Cherekar, MN (2020). Production, Extraction And Uses Of Eco-Enzyme Using Citrus Fruit Waste: Wealth From Waste. *Asian Jr. of Microbiol. Biotech. Env. Sc.,* 22(2), 346–351.

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