



COMBINATION OF DOSES AND PARTICLE SIZE OF SIMPLICIA PAPAYA IN NATURAL FEED AGAINST THE GROWTH PARAMETERS OF GROUPER FISH (*EPINEPHELUS FUSCOGUTTATUS LANCEOLATUS*)

Rita Rostika¹, Yudi Nurul Ihsan², Achmad Rizal², Lantun P. Dewanti¹, M. Rudyansyah Ismail¹, Mochhamad Ikhsan Cahya Utama¹, Muhammad Angga Ekalaya¹

¹Fisheries Development Study Center, Faculty of Fisheries and Marine Science, Universitas Padjadjaran

²Faculty of Fisheries and Marine Science, Universitas Padjadjaran

*Correspondence: ritarostika_unpad@yahoo.com; Tel.: +62-812-2372-988

KeyWords

Particle Size, Dosage, Simplicia Papaya, Daily Growth Rate, Feed Conversion Ratio, Cantang Grouper

ABSTRACT

In the aquaculture industry, the priority is to improve the efficiency of all aspects of feed, including the addition of feed additives that can increase the Daily Growth Rate (DGR) and Feed Conversion Ratio (FCR). Artificial feed and natural feed are treated with exogenous enzymes as feed additives to increase digestibility of feed proteins and increase DGR and FCR. Research into feed additive simplicia papaya which contains protease and saponin enzymes as immunostimulants has been carried out and provides good results for cantang grouper, but the use of nano and micro size enzyme powder and dosage will be tested on natural feed to see the extent of particle size and doses can affect digestibility natural feed on a grouper of bushel.

This research aims at obtaining data the grouper's DGR and grouper's FCR which is fed with nano and micro papaya simplicia. The research is conducted using Completely Randomized Design with 5 treatments and 3 repetitions A: nano simplicia papaya 3.5% application, B: micro simplicia papaya 3.5% application, C: nano simplicia papaya 2% application, D: micro simplicia papaya 2% application, and E: 0% without simplicia papaya). The nano and micro simplicia papaya is done in PRINT-G Universitas Padjadjaran and the grouper culture is done in a Floating Net Cage in Pangandaran Regency.

The addition of papaya simplicia at B to the grouper's pellet feed has some highest DGR by 2,34. The addition of papaya simplicia at A to the grouper's pellet feed has some highest FCR by 2.01 %.

INTRODUCTION

Catang grouper is a hybrid fish from tiger grouper and kertang grouper fish, which is carried out in order to accelerate the growth of groupers, is more resistant to disease but with delicious fish taste. However, in order to increase efficiency, it is necessary to make a number of breakthroughs so that this business is more profitable for farmers, one of which is the addition of exogenous enzymes that are proven to increase protein hydrolysis (Castillo and Gatlin 2015).

Based on the results of a study by Rostika et al. (2016) the application of *Simplicia Papaya* was able to increase protease levels in the intestines of tilapia juwana so that the effect was able to increase the Protein Efficiency Ratio of 2.13% and Growth Rate (*Oreochromis niloticus*) to 2.67%. The papain enzyme is a protease enzyme that is able to hydrolyze complex protein compounds into simple elements (amino acids) so that it can be easily digested optimally by the body of tilapia and catfish seeds (Rostika et al, 2016)

In this research, the enzyme will be given in the form of a rough extract which is mashed into nano particle size. Nano particles are solid particles in diameter between 1 - 100 nm. Nanotechnology can design material in such a way as nano size, so that the desired properties and materials can be obtained without wasting non-lightened atoms (Tiyaboonchai 2003).

The process of digestion itself is influenced by three factors, namely: the presence of enzymes in the digestive tract of fish, the level of activity of digestive enzymes, and the length of food eaten reacts with digestive enzymes. Each of these factors will be influenced by secondary factors related to fish species, age, and size of fish, digestive environment conditions, and composition and amount of feed consumed (Hepher 1988).

The results of Rostika et al (2018b) showed that 5% and 3.75% *simplicia papaya* enhancers had a significant effect on the daily growth rate, feed efficiency, length, number of intestine villi and cell necrosis conditions in heavy groupers.

The purpose of this study was to find micro or nano size enzymes that produced the best growth performance (highest growth rate, best feed conversion ratio).

METHOD

This research is conducted from April 2018 to November 2018, in Aquaculture Laboratory of Fisheries and Marine Sciences Faculty. The fish cultivation is done in the Floating Net Cage in Pangandaran Regency. The enzyme activity test is performed in Chemical Organic Laboratory of Mathematics and Natural Sciences Faculty. Finally, the histological test in the grouper intestine organ is done in Biosystem Laboratory, Biology Department, Mathematics and Natural Sciences Faculty, Padjadjaran University.

Material for Making Micro And Nano *Simplicia papaya* (SP).

Unripe papaya (*Carica papaya*), tools for grated cassava, ball mill, disc mill, baking sheet, sieve mesh number 60 and 100, Tornado Dry Powder System, knife, blender, cutting board, scales, lamp oven, sieve, glass bottle, spoon, plastic pack, and so on.

Material for Culturing The Fish

The tools for cultivating the fish include boat, floating net cage, scales, landing net, fish feed of Japanese brand, trash fish, stationery, calculator and so forth. The tools to for histological analysis include digital microscope, microtome, surgical instruments, fixative solution, ringer solution and others.

The method used in this research is the experimental one with Completely Random Design (CRD) consisting of 5 treatments and 3 repetitions. Fifteen floating nets are prepared to keep the grouper at a density distribution of 50 fishes/net. The treatments in this research are Treatments A, B, C, D, and E (the feed with 3.5% nano SP, 3,75% micro SP, 2,5% nano SP, 2,5% mikro SP, without SP). The observation parameters are the fish's DGR and FCR, the influence of each treatment is tested using F test analysis of variance (ANOVA) at a test interval of 5%. When significant difference is found, it is then followed with Duncan's multiple range test.

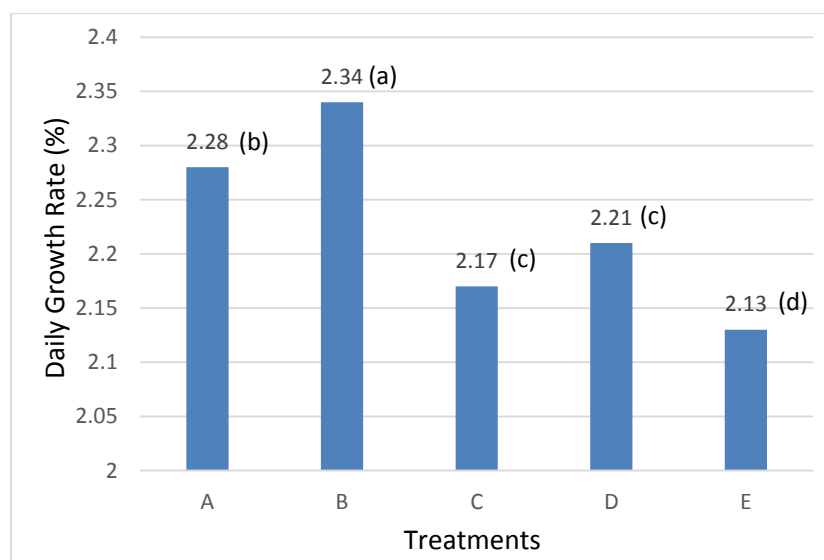
RESULT AND DISCUSSION

Observations on grouper weights produce Daily Growth Rate (DGR) data such as Table 1 below, which is between 2.13 - 2.34.

Tabel 1. Daily Growth Rate of Cantang Grouper

TREATMENTS (%)	REPEATS			SUM	AVERAGE	Varians
	1	2	3			
A	2.28	2.28	2.27	6.83	2.28	0.000033
B	2.36	2.35	2.30	7.01	2.34	0.001033
C	2.11	2.22	2.18	6.51	2.17	0.003100
D	2.28	2.13	2.23	6.64	2.21	0.005833
E	2.19	2.15	2.05	6.39	2.13	0.005200
Total	11.22	11.13	11.03	33.38	11.12667	

When depicted using a graph it will look like figure 1 below



It is very clear in the picture that the presence of the enzyme papain in various doses will be different. Currently, application of various enzymes in aquatic feed has been on the rise to improve the overall quality of diets containing these economical protein sources (Shi et al, 2016). The supplementation of exogenous enzymes to feeds could improve the growth performance of cultured animals by means of enhancing nutrient digestibility, increasing activities of digestive enzymes, and improving the histological structure and the health of intestine (Drew et al., 2005; Farhangi and Carter, 2007; Lin et al., 2007; Mathlouthi et al., 2002 in Castillo and Gatlin, 2015).

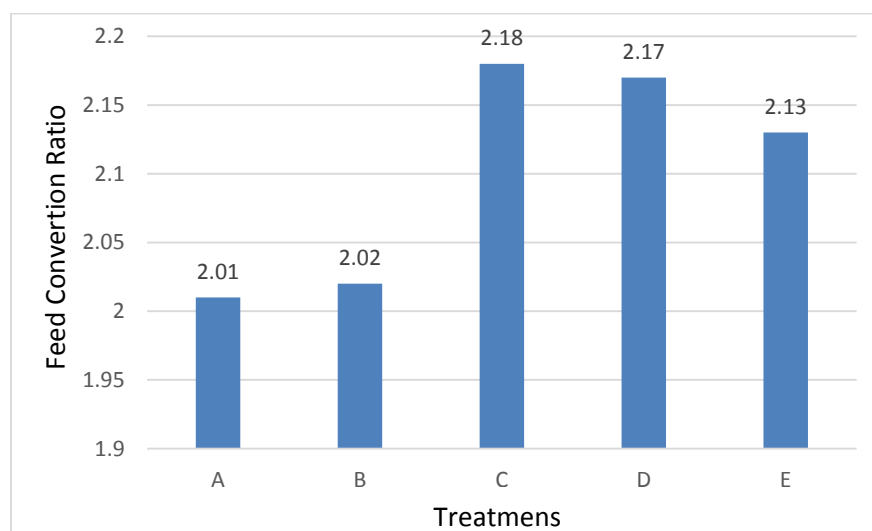
Dietary protease can compensate the deficiency of endogenous enzymes especially for young animal, and assist in the breakdown of macromolecular proteins difficult to digest. Until now, studies regarding exogenous protease supplementation in aquatic feed have been reported in rainbow trout (*Oncorhynchus mykiss*), tilapia (*Oreochromis niloticus* × *Oreochromis aureus*), common carp (*Cyprinus carpio*), Atlantic salmon (*Salmo salar* L.), and white shrimp (*Litopenaeus vannamei*) (Li et al., 2015 Dalsgaard et al., 2012; Dalsgaard et al., 2014; Drew et al., 2005; Farhangi and Carter, 2007; Ogunkoya et al., 2006; Leng et al., 2008; Carter et al., 1994 in Castillo and Gatlin, 2015). In the utilization of enzymes in aquatic feed, a major concern is their stability at various processing conditions including the heat, pressure and moisture. Extrusion is a process that exposes the feed ingredient mixture to high temperature, high pressure and strong shear force over a short period of time, which can inactivate some antinutritional factors and increase the feed safety by destroying pathogenic microorganisms. Compared to a pelleted diet, an extruded diet can improve feed utilization by improving digestibility of starch (Glencross et al., 2012; Krogdahl et al., 2005; Venou et al., 2009), energy (Glencross et al., 2011), and protein (Gaylord et al., 2008; Glencross et al., 2008). However, the high temperature and high pressure during the extruding would cause damage to some heat-sensitive nutrients, such as vitamins and dietary enzymes.

Feed Conversion Ratio

In aquaculture research, the feed conversion ration (FCR) is a key parameter for evaluating fish growth and feed quality. In past decades, FCR has been determined by weighing feed. Fish are weighed at the beginning of the test, fed to satiation, and weight of feed offered at each feeding recorded. Uneaten feed, together with other waste products, is siphoned from the water to ensure collection of all uneaten feed. Uneaten feed is separated from the waste and dried at 105 o 45 C for 24 h or freeze-dried (Hossain et al., 2002; Jobling, 1982 in Li, Wei and Luo, 2014). During the drying process, the feed is weighed, and the process repeated to constant weight. Feed intake is the difference between the weight of the offered feed and that of the dried uneaten feed. The fish are weighed at the end of the test, and biomass gain is the difference between the weight of fish at the beginning and that at end of the test (Li, Wei and Luo, 2014).

Tabel 2. Feed Conversion Ratio (Trash Fish) of Cantang Grouper

Treatments (%)	Repeats			Sum	Average	Varians
	1	2	3			
A (0)	2.10	1.97	1.96	6.03	2.01	0.006100
B (5)	2.03	2.00	2.04	6.07	2.02	0.000433
C (10)	2.18	2.16	2.21	6.55	2.18	0.000633
D (15)	2.03	2.33	2.16	6.52	2.17	0.022633
E	2.18	1.95	2.20	6.33	2.11	0.019300
Total	10.52	10.41	10.57	31.50	10.5	



The FCR of the grouper fish for trash fish supplemented with nano and micro-papaya simplicia during the study showed that in treatments A and B (nano and micro simplicia papaya at a dose of 3.5%) showed no different things. This means that the particle size of simplicia papaya has no effect on DGR and FCR (Table 2). Technically the best treatment is treatment B.

Conclusion

The addition of papaya simplicia at nano and micro simplicia papaya to the grouper’s feed has some highest Daily Growth rate 2,28 and 2,34. The addition of papaya simplicia at nano and micro to the grouper’s feed has same Feed Conversion Ratio 2,01 until 2,18.

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