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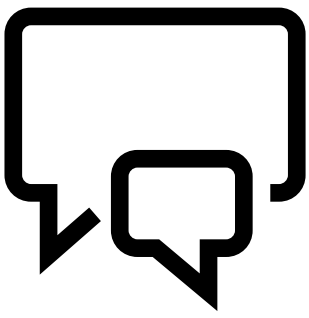

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the control. In groups using Compounds II, III, and IV, the level of glucose consumption declined by 4.8, 6.2 and 3.4%, respectively, relative to the control. In the case of the group using Compound VI, this parameter was 6.0% higher as compared to the control group. In groups using Compounds V, VII and VIII, glucose uptake level slightly differed from the control. In group IX, glucose consumption by cells was 12.7% lower than in the control group.

Summary

Compound VI at doses of 0.1 mM /l and 1.0 mM/l, the proliferative activity increases by 4 and 20%, respectively. When the LEC cell line is exposed to Compound VI at a dose of 0.1 mM/l, the level of glucose uptake by cells increases by 6% as compared to the control. This effect of Compound VI is associated with the presence of sulfur in the 2nd position. The introduction of an amino group in the 6th position (Compounds III and IV) decreases the viability and proliferative activity of the cells. The 6-alkyl-substituted uracil derivatives have low toxicity on eukaryotic cells, which suggests the possibility of using these compounds in medical practice to repair defects of the bone tissue.

Acknowledgment

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Significant Economic Advantage of Adding Noni Fruit Extract in Feed of Catfish Cultivation

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Abstract

This study aims to determine the effect of the addition of noni fruit (Morinda citrifolia) on commercial feed on the specific growth rate, feed conversion ratio, daily length growth rate, crude protein digestibility, and protein retention of sangkuriang catfish (*Clarias sp.*). The results showed that the addition of noni juice on commercial feed for 30 days of maintenance specific growth rate, feed conversion ratio, crude protein digestibility, and protein retention of sangkuriang catfish (*Clarias sp.*) toward economic adventage.

Key words: Noni fruit, catfish, economic adventage.

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Sangkuriang catfish is one type of freshwater fish that has been commercially cultivated in Indonesia. The interest of cultivators to continue to cultivate Sangkuriang catfish is due to the increasing market demand for Sangkuriang catfish, resulting in a lot of farmers using the intensive system of cultivation (Muzni, 2014). Intensive cultivation is generally characterized by high stocking densities that require large amounts of feed to meet the nutritional requirements of the fish. Feed is one of the important elements in cultivation activities that support the growth and survival of fish (Arief et al., 2014). The feed costs about 60-70% of the total production cost, so it needs an effective and efficient management (Handajani, 2011).

The popularity of noni juice is increasing globally. Noni is now widely used as a juice and dietary supplement (Motshakeri and Ghazali, 2015; Assi *et al*. 2017). Thus, knowledge of its nutritional properties is needed for decision making (West *et al*., 2009). Noni Fruit extract as feed additive in different doses for economic adventage of catfish farming in the experimental design for this study.

Materials and Methods

Twenty aquariums measuring 30x30x35cm with accessories aeration hoses, aeration stones, aerators, extension cables, water tanks, fishnets and analytical scales with 0.01g accuracy were used ruler, measuring cylinders, scoops, digital thermometers, plastic hoses, section sets and sample bottles.

Two hundred of Sangkuriang catfish seeds (*Clarias* Sp.) measuring 6-8cm with an average weight of 4-5g of 200 obtained from fish farmers in Sidoarjo, commercial feed, egg whites, mori cloth, noni juice (Morinda citrifolia), liquid soap, plastic bags, pH papers, dissolved oxygen test kit,s ammonia test kits and chlorine.

The noni juice mixed with 10 ml of egg white and sprayed on the feed in small quantities while being stirred. Then dried by being aerated. The study was conducted by maintaining the Sangkuriang catfish for 30 days with the treatment of the dose of noni juice of 0 ml/kg of feed, 5 ml/kg of feed, 10 ml/kg of feed, 15 ml/kg of feed and 20 ml/kg of feed. The maintenance period began with the process of acclimatization of test fish to the environment for up to 7 days, making up a total breeding duration of 37 days. The amount of feed given was 10% of the fish's body weight (Sunarma, 2004). The frequency of feeding was as many as three times a day at 09.00, 12.00, and 16.00 (Ahmadi *et al*., 2012).

The removal of the leftover feed and metabolic impurities found in the aquarium was performed every 3-4 days in the morning before feeding. The body weight and length were taken every 7 days. The water quality parameter measurements were performed once a week at 08.00 a.m.

The calculation of the digestibility value of crude protein and crude fat was done by taking fish feces via a surgical technique. The fecal sampling was performed by first feeding the test fish followed by withholding feed for 24 hours as an attempt to empty the stomach, after which the fish was fed for 1 hour. Seven hours after, the feces was collection for analysis of crude protein content and crude fat. Proximate analysis was performed at the beginning and end of the study to determine the level of protein and fat content of the catfish after treatment.

The data on *specific growth rate*, *feed conversion ratio*, crude protein digestibility, crude fat, and protein retention of fat. The supporting parameter like water quality based on temperature, pH, *dissolved oxygen*, ammonia and daily length growth rate were recorded. Data was analayzed by Duncan's Multiple Comparison Test.

Results and Discussion

The value of specific growth rate of Sangkuriang catfish ranges between 4,60-4,75 %/ day (Table I). The result is better compared to Sunarma (2004) who found the daily growth of Sangkuriang catfish's weight at 3 months to be 3.53%. Fish growth is closely related to the availability of protein in the diet, because protein provide nutrient for growth (Aggraeni and Abdulgani,2013; Adams, 2000). Nutrients can be absorbed from the addition of noni juice in the feed (Wang, 2002).

Based on research results, the feed conversion ratio of Sangkuriang ranged from

Table I: Performance of Sangkuriang Catfish Feed With Noni Fruit Extract

Treatment	Specific growth rate (% / day)	Feed convertion ratio	Daily Lenght Growth Rate (% / day)	Crude Protein Digestibility (%)	Protein Retention (%)
P0	4.63[a] ±0.02	0.99[a] ±0.06	2.28 ±0.14	99.96[a]	5.28[a] ±0.20
P1	4.60[a] ±0.07	0.98[a] ±0.04	2.28 ±0.20	99.96[a]	5.39[a] ±0.45
P2	4.64[a] ±0.04	095[a] ±0.07	2.27 ±0.14	99.97[ab]	5.74[a] ±0.21
P3	4.67[a] ±0.04	0.93[ab] ±0.02	2.26 ±0.13	99.97[ab]	5.64[a] ±0.25
P4	4.75[b] ±0.02	0.83[b] ±0.09	2.25 ±0.22	99.98[b]	6.49[b] ±0.73

Means bearing different superscripts in a row differ significantly ($p<0.05$).

0.83 to 0.99 (Table I). The dose of 15 ml / kg (P3) of noni juice is considered to be the correct dose to improve the digestive tract of Sangkuriang catfish, since the fish are able to digest the feed efficiently. The daily length growth rate of Sangkuriang catfish ranges from 2.25-2.28% / day (Table I). This is due to the same size of container and volume of water, so as to produce the same daily growth rate.

The results showed that the digestibility values of crude protein of Sangkuriang catfish range from 99.96% -99.98% (Table I). The high crude protein digestibility value (P4) was supported with a low *feed conversion ratio* value (P4). The dose of noni juice of 20 ml/kg (P4) feed is thought to be the right dose to improve the digestive tract of Sangkuriang catfish. This is because the P4 content of xeronine in the noni juice is higher than in other treatments. The lack of xeronine substances will have an impact on the absorption of nutrients.

Noni juice feeding gave the best result in increasing the protein retention of Sangkuriang catfish protein between 5.28-6.49% (Table I) due to xeronine activity. Xeronine works to activate enzymes and regulate protein systhesis (Wang *et al*., *loc. cit*). Higher retention rates in fish are better able to convert proteins from feed into animal proteins leading to good specific growth.

Summary

This study gave the conclusion that the addition of noni juice *(Morinda citrifolia)* on commercial feed of 20 ml/kg (P4) can produce the highest specific growth rate of 4.756%/day and also yield a low value of f*eed conversion ratio* at 0.837 with a crude protein digestibility value of 99.98%, and fat digestibility of 99.9972% were recorded in the addition of noni juice to commercial feed at 5 ml/ kg (P1). High protein retention value of 6.49%, and fat retention of 15.71% were recorded.

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