



## Utilization of papaya leaves (*Carica papaya*) in feed on growth of catfish (*Clarias sp.*) in Muara Enim, South Sumatera

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### ARTICLE INFO

### ABSTRACT

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The feed must have a quality that matches the needs of the fish to produce high fish growth. Feed quality can be improved by adding alternative ingredients to feed. One alternative material that can be used is papaya leaves. The purpose of this study was to determine the effect of adding papaya leaves to feed on the growth of catfish (*Clarias sp.*). This research was conducted in Muara Enim, South Sumatera in August 2020. The treatments were P0: control (without adding papaya leaves) and P1: with the addition of papaya leaves. The data observed included absolute growth, specific growth rate, feed efficiency, and survival. Fish maintenance data that obtained in treatment P1 treatment using leaves papaya produced absolute weight growth of 10.57 g, absolute length growth of 5.17 cm, specific growth rate of 5.49%, feed efficiency 100.83%, and survival 60%. The results obtained indicate that the provision of papaya leaves affects the growth of catfish.

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## 1. Introduction

Catfish (*Clarias sp.*) is a freshwater commodity that is widely cultivated in Indonesia. Catfish has advantages including its delicious taste and savory meat taste, so that it is popular with many consumers, as well as a source of animal protein which is relatively easy to obtain and the price is still affordable. This makes catfish market demand quite high (Hasad et al., 2018). To meet the high market demand, fish production is also high. Catfish production can be increased by cultivation activities. Based on data compiled from major provisions and commodities in 2017, the availability of catfish stocks in South Sumatera Province amounted to 136,469 tonnes (BPS, 2019).

The feed is one of the important elements in the process of aquaculture, which functions to support the growth and survival of cultivated fish. Feed also serves as an energy supplier for fish to spur growth. According to [Arief et al., \(2014\)](#) stated that feed in cultivation activities is generally commercial feed which spends around 60-70% of the total cultivation cost.

The feed must have a nutritional value by the following fish to produce high fish growth. The artificial feed is very much determined by the constituent raw materials, especially sources of protein, fat, carbohydrates, and other supplements such as minerals ([Mapparimeng, 2016](#)). Good quality feed can increase feed efficiency to reduce production costs. Feed quality can be improved by adding alternative ingredients to feed. One alternative material that can be used is papaya leaves (*Carica papaya*). According to [Nwofia et al., \(2012\)](#), papaya leaves contain 75.06% carbohydrate, 8.4% protein, 12.5% crude fiber, 2.2% fat, and 12.40% ash, 4.57% calcium, phosphorus 0.38%, Beta-N 33.37%, gross energy 4102 (kcal/kg). Papaya leaves contain one of the protease enzymes which function to break down protein into amino acids so that it can increase feed digestibility, with the ultimate goal of increasing aquaculture production yields ([Isnawati et al., 2015](#)). Therefore it is necessary to research the use of papaya leaves in catfish feed. The purpose of this study was to determine the effect of adding papaya leaves to feed on the growth of catfish (*Clarias* sp).

## 2. Material and methods

### 2.1. Place and Time

This research was conducted in Muara Enim Regency, South Sumatera in August 2020.

### 2.2. Materials

The tools used include waring 1×1×1.5 m<sup>3</sup>, thermometer, scale, ruler, feed printer, pH meter, blender. While the materials used include papaya leaves, 30% commercial protein feed, fish size 5 cm, and tapioca flour.

### 2.3. Method

#### 2.3.1. Experimental Diet

**Tabel 1.** Experimental diet with difference proportion of commercial feed, papaya leaf

Composition	Treatments	
	P0 (control)	P1
Commercial feed (%)	95	92.5
Papaya Leaf (%)	-	2.5
Tapioca flour (%)	5	5
Total	100	100

#### 2.3.2. Making Papaya Leaf Flour

The papaya leaves used are not too old papaya leaves, which are marked by green leaves. Papaya leaves are rinsed using clean water to remove dirt that sticks to the papaya leaves. According to [Hasad et al., \(2018\)](#) papaya leaves are cut to a size of ± 3 cm, after that, grind them using a blender, then blender the papaya leaves into a powder then dry in the sun for ± 2 days or until dry then sieved before use.

### 2.3.3. Feed Making Treatment

The process of making 1 kg of treatment feed with a dosage of 2.5% papaya leaves and 5% tapioca flour, is done by pulverizing the commercial feed which is pounded into a powder as much as 92.5 g then adding 2.5 g of mashed papaya leaves, then add 5 g of tapioca flour which functions as an adhesive. All ingredients are mixed and stirred until blended and given 500 ml of warm water gradually until it forms a doughy dough. Furthermore, the dough is molded using a feed grinder. After printing, the feed is dried in the sun for 2 days or until dry, then the feed is stored in a closed container and protected from direct sunlight.

### 2.3.4. Maintenance

The catfish seeds used are 5-8 cm, with a stocking density of 50 fish/waring ([Hengsawat et al., 1997](#)). Before stocking, the fish is acclimatized first so that the fish is not stressed. Then adapt the fish to the feed for 5 days after which the fish were measured the initial weight and length as the initial sampling.

The control fish were given commercial feed, while the treated fish were given treated feed mixed with papaya leaf flour. Feeding both control and treatment were carried out three times a day, at 08.00 am, 12.00 am, 5.00 pm. The amount of feed given is 5% of body weight. Measurement of water quality in the form of pH and temperature is carried out every morning during the maintenance period. Every 7 days the fish were sampled.

## 2.4. Parameters

### 2.4.1. Growth

#### *Absolute Length Growth*

The absolute length growth during maintenance is calculated using the formula as follows:

$$L = L_t - L_0$$

Information:

L = absolute length growth of fish (cm)

L<sub>t</sub> = Length of fish at the end of maintenance (cm)

L<sub>0</sub> = Length of fish at the beginning of rearing (cm)

#### *Absolute Weight Growth*

The absolute weight growth during maintenance is calculated using the formula, as follows:

$$W = W_t - W_0$$

Information:

W = absolute growth of reared fish (g)

W<sub>t</sub> = weight of fish at the end of rearing (g)

W<sub>0</sub> = Fish weight at the beginning of rearing (g)

### 2.4.2. Specific Growth Rate

The specific growth rate during maintenance is calculated using the formula, as follows:

$$SGR = \frac{\ln W_t - \ln W_0}{t} \times 100\%$$

Information:

W<sub>t</sub> = weight of fish at the end of rearing (g)

W<sub>0</sub> = Fish weight at the beginning of rearing (g)

t = Time (days)

### 2.4.3. Feed Efficiency

Feed efficiency is calculated using the following formula:

$$EP = \frac{(Wt - Wd) - W_o}{F} \times 100\%$$

Information:

EP = Feed efficiency (%)

Wt = final weight of fish biomass (g)

W<sub>o</sub> = initial weight of fish biomass (g)

Wd = Weight of dead fish (g)

F = weight of feed given (g)

### 2.4.4. Survival Rate

The percentage of survival rate can be calculated using the formula, as follows:

$$SR = \frac{N_t}{N_o} \times 100\%$$

Information;

SR = Survival Rate (%)

N<sub>0</sub> = Number of fish at the beginning of maintenance (tail)

N<sub>t</sub> = Number of fish at the end of maintenance (tail)

### 2.4.5. Water quality

Water quality parameters measured are temperature and pH. Measurement of temperature and pH of maintenance water is carried out every morning and when the fish die.

## 2.5. Analysis Data

Growth data, specific growth rate, feed efficiency, survival, and water quality obtained will then be processed using Microsoft Excel and analyzed descriptively and supported by literature.

## 3. Results and Discussion

After maintaining the fish for 35 days of rearing, data on growth in absolute weight, absolute length, specific growth rate (SGR), feed efficiency (FE), and survival rate (SR) during rearing can be seen in Table 2.

**Table 2.** Data of absolute length growth, absolute weight growth, specific growth rate (SGR), feed efficiency (EP), survival rate (SR) of catfish

Treatments	Absolute length growth (cm)	Absolute weight growth (g)	SGR (%)	FE (%)	SR (%)
P0	5.13	8.43	5.01	95.77	76
P1	5.17	10.57	5.49	100.83	60

Based on the results obtained in Table 5.1 shows the growth of catfish at absolute length with the addition of papaya leaf meal which is 5.17 cm and commercial feed 5.13 cm. The absolute

weight with the addition of papaya leaf flour was 10.57 g greater than the commercial feed (control) of 8.43 g, this is thought to be the effect of the papain enzyme contained in papaya leaves. The papain enzyme has the function of increasing digestibility in fish so that the growth of fish treated with feed with the addition of papaya leaf meal is higher (Isnawati et al., 2015). This is because papaya leaves contain papain enzymes that have broad proteolytic activity against the protein, short peptide bonds, amino acid esters, and amide groups, especially those involving basic amino acids such as arginine, lysine, and phenylalanine (Amri and Mamboya, 2013). The papain enzyme is a protease enzyme that is used in the complete breakdown and breakdown of peptide bonds in proteins into simpler peptide bonds through its hydrolysis ability. The more papain enzymes, the more protein is hydrolyzed into amino acids which are available to be absorbed and used by the fish body for the maintenance of body tissue, fish body activity, and also growth (Rachmawati et al., 2016). This was also evidenced by the specific growth rate of fish which by feeding with the addition of papaya leaves resulted in a higher growth rate of 5.49% compared to control, namely 5.01%.

The feed efficiency data obtained during the maintenance of the treated feed was 100.83% while the control was 95.77% (Table 5.1). According to Ahmadi et al., (2012), feed efficiency is said to be good when it is in the value of 50% -100%. According to Andisan (2012) the higher the feed efficiency value, the more maximum the feed is used for fish. One of the causes of the difference in the level of feed efficiency is influenced by the content and characteristics of the feed. The catfish feed which is added with papaya leaf flour is higher than the catfish that is not given papaya leaf flour. Papaya leaves have a lot of content, one of which is the protease enzyme which functions to break down protein into amino acids so that it can improve feed digestibility (Isnawati et al., 2015). Christianah and Badirat (2013) reported that the addition of 20% papaya leaf meal to catfish feed formulations can increase the efficiency of protein utilization, growth, survival, and feed conversion.

The results of the percentage of survival data for catfish that are kept in treatment and control have a range of 70% -76% (table 5.1) According to BSN (2014), the survival rate of catfish measuring 5-7 cm (IV nursery) has a minimum survival value of 60 %. The survival of the treated fish was lower than the fish fed the control diet, this was due to the addition of papaya leaf meal containing excess anti-nutritional substances such as alkaloids and saponins (Kasiati et al., 2016), which could reduce the survival of catfish. Based on Rosmawaty et al., (2016), increasing the high concentration of saponins and alkaloids in feed can be toxic to carp, resulting in low survival. During maintenance, water quality is always observed every day and the results are in the optimal range (Table 3).

Table 3. Water quality

Water quality	P0	P1
Temp (°C)	26.1 – 29.2	26.5 – 29.5
pH	6.8 – 8.1	6.7 – 8

Water quality is the most concerning factor in fish farming because if it does not affect the survival or growth of fish. Good water quality in catfish farming according to BSN (2000), the optimal temperature for catfish is in the range of 25-30°C and pH of 6.5–8.5. Water temperature in maintenance ranges from 26.1 - 29.2°C and pH 6.8 - 8.1. The water quality is the optimal range for catfish so that growth is not disturbed, if the water quality is below or above the optimal value it

can be causing fish stress and decreased appetite for fish which causes fish growth to slow down or the most extreme impact causes death in the fish being kept.

#### 4. Conclusion

Based on the results obtained, it can be concluded that the addition of papaya leaf meal to fish feed resulted in the absolute weight growth of catfish of 10.57 g, absolute length growth of catfish 5.17 cm, the specific growth rate of 5.49%, and feed efficiency of 100.83%.

#### References

- Ahmadi, H., Iskandar, & Kurniawati, N. (2012). Pemberian probiotik dalam pakan terhadap pertumbuhan lele sangkuriang (*Clarias gariepinus*) pada pendederan II. *Jurnal Perikanan Dan Kelautan*, 3(4): 99-107.
- Amri, E., & Mamboya, F. (2013). Papain, a plant enzyme of biological importance: A review. *American journal of biochemistry and biotechnology*, 8(2): 99 – 104.
- Andisan. (2012). *Probiotik Akuakultur*. Yogyakarta: Gadjah Mada University Press.
- Arief, M., Fitriani, N., & Subekti, S. (2014). Pengaruh pemberian probiotik berbeda pada pakan komersial terhadap pertumbuhan dan efisiensi pakan ikan lele sangkuriang (*Clarias* sp). *Jurnal Ilmiah Perikanan Dan Kelautan*. 6(1): 49-53.
- BPS (Badan Pusat Statistik). (2019). *Produksi Perikanan Budidaya Menurut Provinsi dan Komoditas utama 2017*. Jakarta: Data kelautan dan Perikanan.
- BSN (Badan Standarisasi Nasional). (2000). *SNI (Standar Nasional Indonesia) 01-6484.3 - 2000. Produksi benih ikan lele dumbo (Clarias gaperiepinus x C. fuscus) kelas induk pokok (parent stock)*. Jakarta : Badan Standar Nasional Indonesia.
- BSN (Badan Standarisasi Nasional). (2014). *SNI (Standar Nasional Indonesia) 6484.4 - 2014. Ikan Lele Dumbo (Clarias sp) Bagian 4 Produksi Benih*. Jakarta: Badan Standarisasi Nasional.
- Chriatianah, O. & Badirat, S. (2013). The effect of pawpaw (*Carica papaya*) leave meal on the growth performance and blood profile of African Cat Fish. *Transnational Journal of Science and Technology*, 3(7): 1-13.
- Hengswat, K., Ward, F., & Pornchai, J. (1997). The effect of stocking density on yield, growth and mortality of African catfish (*Clarias gariepinus burchell* 1822) cultured in cages. *J Aquaculture* 1(4): 67-76.
- Hasad, M., Nasriani, & Febriyanti, T. L. (2018). Fortifikasi daun pepaya dalam pakan ikan sebagai upaya pengembangan pembudidaya lele sangkuriang (*Clarias gariepinus*) di Gorontalo. *Prosiding Konferensi Tahunan Keadilan Sosial*: 171-178.
- Isnawati, N., Sidik, R., & Mahasri, G. 2015. Potensi serbuk daun pepaya untuk meningkatkan efisiensi pemanfaatan pakan, rasio efisiensi protein dan laju pertumbuhan relatif pada budidaya ikan nila (*Oreochromis niloticus*). *Jurnal Ilmiah Perikanan dan Kelautan*. 7(2): 121-124.
- Kasiati, E., Koniyo, Y., & Juliana. (2016). Pengaruh perendaman larutan daun pepaya (*Carica papaya*) terhadap sintasan benih ikan nila (*Orheocromis niloticus*) yang Terinfeksi Parasit *Trichodina* sp. *Nikè: Jurnal Ilmiah Perikanan dan Kelautan* 4(2): 50-55.
- Mapparimeng. 2016. Pengaruh penambahan ekstrak daun pepaya (*C. papaya*) pada pakan ikan nila (*O. niloticus*). *Jurnal Agrominansia*. 1(2): 148-158.
- Nwofia, G. E., Ojmelukwe, P., Eji, C. (2012). Chemical composition of leaves, fruit pulp, and seeds in some *Carica papaya* (L) morphotypes. *Int. J. Med Arom, Plants*. 2(1): 200-206.

- Rachmawati, D., Samidjan, I., Hutabarat, J. (2016). Aplikasi enzim papain dalam pakan buatan sebagai pemacu pertumbuhan upaya percepatan produksi lele sangkuriang di Kawasan Kampung Lele Desa Wonosari. *Prosiding Seminar Nasional Kelautan.*, 1 – 5.
- Rosmawaty, R., Rosidah, Liviawaty, E. (2016). Pemanfaatan ekstrak kulit jengkol dalam pakan ikan untuk meningkatkan imunitas benih gurame (*Osphronemus gouramy*) terhadap infeksi bakteri *Aeromonas hydrophila*. *Jurnal Perikanan Kelautan* 7(1) 14-22.