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# THE UTILIZATION OF VEGETABLE WASTE ON THE GROWTH OF GRASS CARP (CTENOPHARYNGODON IDELLA)

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ABSTRACT

The availability of artificial feed that is sufficient in both quality and quantity is one of the conditions needed to enable the best possible growth of fish. Feed plays a crucial part in those operations because it makes up between 40 and 60 percent of the cost of fish farming operations. In order to support the goals of aquaculture development, increasing the efficiency of the aquaculture industry must be done largely to raise the purchasing power of the domestic population. Attempts are being made to find alternatives to the aforementioned artificial feed, one of which entails using the world around us as a source of raw materials. Vegetable waste, for instance, has the potential to be processed to produce environmentally friendly alternative feed. Vegetable waste is a type of waste material that is derived from agricultural residues (crop residue), harvesting residues, and market residues. Because this remaining has a high moisture content, fish can utilize it for its nutritional value. One of the approaches to obtain a cost-effective alternative feed is this waste treatment. This study is anticipated to teach fish producers on how to produce fish at a reasonable price as grass carp (*Ctenopharyngodon idella*) using agricultural trash. The outcomes can then be used to develop fish feed that is both inexpensive and produces the best output.

**1. INTRODUCTION**

In an effort to provide fish feed, the challenge faced up until now is how to make artificial feed that is of high quality, effective, efficient, and environmentally friendly while still being able to be obtained at a reasonably affordable price. One of the requirements for supporting the optimal growth of fish is the availability of artificial feed that is sufficient in quality and quantity [1],[2].

Given that feed accounts for between 40 and 60 percent of the cost of fish farming operations, it plays a critical role in those operations. Increasing the efficiency of the aquaculture industry must be done primarily to increase the purchasing power of the domestic community in order to align with the objectives of aquaculture development, which include meeting the dominant needs in the supply of animal protein, creating foreign exchange, and improving human welfare. It is a sensible decision to attempt to lower feed production costs without lowering its biological function [3].

Efforts to overcome the desired artificial feed above, one of which is to seek alternative feeds by utilizing the potential of the surrounding environment as raw materials. The potential is for example vegetable waste, processing this waste is one of the efforts to get an economical alternative feed. The rationalization of feed production costs can be achieved by utilizing alternative feed sources as feed raw materials in the formulation [2]. The search for alternative feed ingredients can be carried out in the following steps: Identify local raw materials that can substitute fish meal feed as a protein source; study of biotechnology so that the digestibility of these potential raw materials is improved; making feed formulations with high nutritional value and affordable.

It is becoming increasingly difficult to find a place to dispose of waste, especially waste and market waste, which is also a pollutant since it is easily to decay because it is contaminated by microorganisms. As a result, the problem of waste is beginning to warrant considerable attention. Recycling that respects the environment calls for the right measures, one of which is using it as feed, which at the moment must also be a worry given the scarcity of inexpensive feed ingredients. Vegetable waste is a type of waste material that is derived from agricultural residues (crop residue), harvesting residues, and market residues. Because this remaining has a high moisture con-

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tent, fish can utilize it for its nutritional value. One of the approaches to obtain a cost-effective alternative feed is this waste treatment [4].

Figure 1. Grass carp (*Ctenopharyngodon idella*)

Many areas in Indonesia have cultured various herbivorous fish and Grass carp (*Ctenopharyngodon idella*) is one of them that still has low economical value. This fish also called grass carp originally derived from Eastern China was imported to Indonesia in 1915 in Sumatra and in 1949 imported to Java for cultivation purposes. Grass carp are herbivorous fish that live in fresh water. This type of fish eats aquatic plants such as *Hydrilla* sp., *Salvinia*, grasses and other aquatic plants, hence this type of fish can be used as a water weed control fish both in ponds and in public waters. Grass carp can reach a maximum size of 120 cm in length and a body weight of 20 kg [5], [6]. The physical characteristics of this fish are dark yellowish gray with a mixture of silver sheen, elongated body, wide head with a short round snout, paringeal teeth in a double row with a comb-like shape. The broodstock can spawn at the age of 3-4 years with the female weighing up to 3 kg and the male 2 kg, while spawning usually takes place in the rainy season. This study is expected to provide information to fish farmers about the production of affordable fish through the use of agricultural waste. Then the results can be applied to overcome fish feed with low cost and optimal production results.



## 2. MATERIALS AND METHOD

The location of this research activity is in the Ciparanje Experimental Pond, Faculty of Fisheries and Marine Sciences, Universitas Padjadjaran University and the Laboratory of Animal Feed Analysis, Faculty of Animal Husbandry, Padjadjaran University. The materials used in this study consisted of Test Fish namely fish with low economic value, namely Grass carp (*Ctenopharyngodon idella*). The average body weight of the Grass carp used was 1.7 grams as many as 500 fishes. Grass carp fry were obtained from the Sukabumi Center for Freshwater Aquaculture Development (BBPBAT). In addition to the test fish, other materials used are test feed in the form of vegetable waste consisting of: water spinach waste, mustard greens, and a mixture of water spinach and mustard waste. The feed was obtained from the Cileunyi market, Bandung Regency. The instruments used in the study were as a Experimental Container in the form of a ground pond measuring 3x7 $m^2$ as many as 6 units.

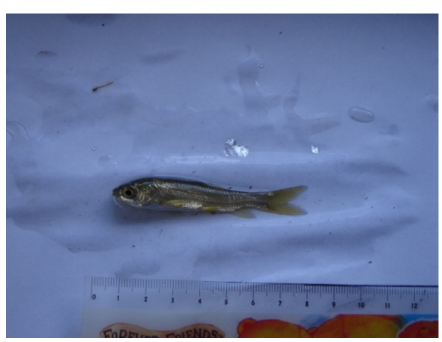

Figure 2. Grass carp Fry

The research was conducted in several stages, including physical identification of raw materials and biological tests. At physical identification of raw materials stage, activities include collecting data on waste products, types and physical forms of waste, alternative methods of processing and use. This stage is done by collecting secondary data using the survey method. The results obtained are then presented in a descriptive analysis. The stages of biological test research consist of growth and feed conversion tests. Activities are carried out in stages:

*Pond Preparation*

The pond to be used must first be cleaned of grass and weeds. The pond was dried for 3 days, then fertilized using organic and inorganic fertilizers. The organic fertilizer used is dry chicken manure, while the inorganic fertilizer is urea.

*Trial Pond Tile Layout Settings*

The experimental pond is a soil-based pond that is limited by a net in each plot. Layout settings are done randomly.

*Maintenance of Test Fish to Determine Initial Weight* ($W_o$)

The procedure for this stage includes:

a. Each test fish is weighed,
b. The test fish were put into the experimental pond plots with a density of 100 fish/pond,
c. Fish are fed about 75 grams of vegetable waste per day. The feed given previously has been withered, chopped, and mixed homogeneously,
d. Feeding is done once a day at 08:00 AM
e. Sampling weighing biomass weights is carried out once a week for 3 months of maintenance. Feed adjustments were made after weighing the fish.

*Parameters*

Observation parameters in this study include absolute growth and feed conversion (KP) [5]

## 3. RESULTS AND DISCUSSION

### Absolute Growth

Growth is the process of increasing the length and weight of an organism that can be seen from changes in length and weight in units of time. Fish growth is influenced by the quality and quantity of feed, age and water quality [7]. [7],[8] claim that there are both internal and exterior factors that affect growth. Internal aspects include genetics, illness resistance, and the capacity to use food, while external factors include the physical, chemical, and biological properties of the waters. Growth is defined by [7],[9] as a rise in fish weight or length over a specific period of time that is brought on by tissue changes brought on by muscle and bone cell division, the biggest components of the fish body.

Table 1. Average Absolute Growth (g) Grass carp with Different Types of Feed

| Absolute growth (g) | | |
|---|---|---|
| **Water Spinach (I)** | **Mustard Greens (II)** | **Mixed (III)** |
| 3.67 | 4.14 | 4.37 |

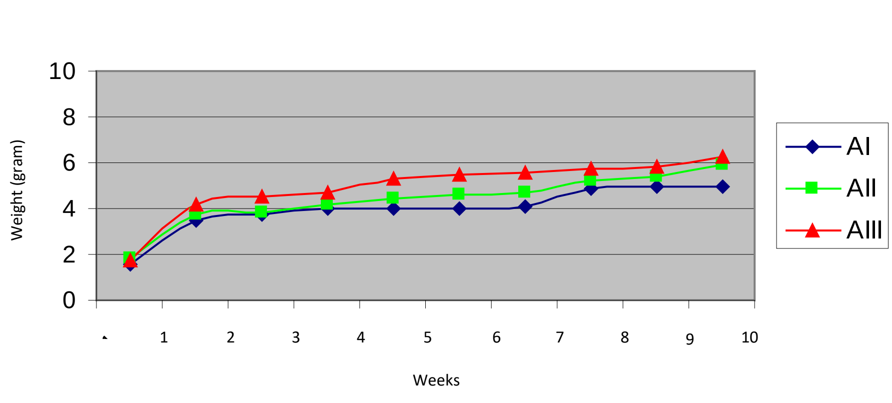


Figure 3. Grass carp Growth Chart for 10 weeks

From Figure 3, it appears that there is a fairly high growth for Grass carp with a growth value of 36.55 grams. The growth response by feeding a combination of water spinach and mustard greens gave the highest absolute growth value, which was 4.37 g. This is different from the absolute growth response of fish fed with water spinach or mustard only, which are 3.67 g and 4.14 g, respectively. This difference in absolute growth response seems to be due to the complementary effect of these two types of vegetables.

As is known, protein is a complex organic compound that has a high molecular weight. Like carbohydrates and lipids, proteins contain the elements carbon, hydrogen, and oxygen, but in addition all proteins contain nitrogen. Most proteins contain sulfur, some proteins contain phosphorus. Nearly 50% of the dry weight of an animal cell is protein. The building blocks of the structure of cells, antibodies, and many hormones are proteins. In addition, about 90% of the cell's proteins are enzymes upon which the basic structure depends which determines the function of the cell. For example, there are about 1000 different enzyme units in a cell [3], [5], [10].

Protein consumed in the digestive tract will be metabolized into simpler forms, namely amino acids. Once absorbed in the small intestine, these amino acids will be deposited into body proteins. With a low protein content, vegetables do not mean low protein deposition, because even carbohydrates can be converted into body protein, especially for herbivorous fish [6], [9].

### Feed Conversion

Feed conversion is influenced by various factors, namely the type of feed, feed composition, digestibility of feed, palatability, besides that it is also determined by the type of fish. For artificial feed that is completely formulated according to the needs of fish, it generally has a conversion of 1.5 – 3, while for vegetable feed it has high absorption, low protein, and high crude fiber. For carnivorous and omnivorous fish, artificial feed provides low feed conversion, where the lower feed conversion means the less amount of feed given. This is because artificial feed is prepared based on raw materials with a high level of digestibility, such as fish meal, soybean meal, and seeds. For vegetable-based feeding, the conversion value will automatically increase due to the limited nutritional value of feed ingredients, in this case due to high absorption/water content of around 90%, while for artificial feed the water content is 10-15% [11],[12].

Table 2. Average Conversion of Grass carp Feed with Different Types of Feed

| **Feed Conversion** | | |
|---|---|---|
| **Water Spinach** | **Mustard Greens** | **Mixed** |
| 26.38 | 25.98 | 21.00 |

Feeding with faster time intervals will provide more protein intake than fish fed with longer intervals [13]. This is in accordance with the statement of [13],[14], that protein digestibility tends to increase with increasing protein levels in the feed. The increase in protein levels in the feed is certainly influenced by the frequency of feeding faster than feeding with a longer frequency. Conversion and feed efficiency are closely related to the digestibility value. The greater the digestibility value of a feed, the more nutrients in the feed are used for fish growth [13],[15].

## Conclusion

The absolute growth of some Grass carp showed good results, i.e., 36.55 grams during maintenance for 10 weeks. In addition, vegetable waste given as fish feed gives relatively the same results to feed conversion, namely between 21-26.38. This means that this vegetable waste is potential to use as fish feed.

## References

[1] Alamsyah. 2005. Pengolahan Pakan Ayam dan Ikan Secara Modern. Penebar Swadaya, Jakarta
[2] Lovell, R.T. 1989. Nutrition and Feeding of Fish. An AVI Book, Van Nostrand Reinhold. Auburn University. New York. 217 p
[3] Mudjiman, A. 1989. Makanan Ikan.Penebar Swadaya. Jakarta.190 p
[4] Miranti S, Putra WKA. Uji Potensi Limbah Ikan dari Pasar Tradisional di Kota Tanjungpinang sebagai Bahan Baku Alternatif Pembuatan Pakan untuk Budidaya Ikan Laut. Intek Akuakultur. 2019; 3 (1): 8-15. Indonesia
[5] Suedjono, R.1983. Nutrient Requirements of Warmwater Fishes and Shellfishes. National Academy Press.Washington.
[6] Effendie.1978. Biologi Perikanan (Bagian I: Studi Natural History). Fakultas Perikanan, IPB. Bogor
[7] Mulqan, M, El Rahimi, SA, Dewiyanti, I. 2017. The Growth and Survival rates of Tilapia Juvenile (*Oreochromis niloticus*) in Aquaponics Systems with Different Plants Species. *Jurnal Ilmiah Mahasiswa Kelautan dan Perikanan Unsyiah*. 2 (1): 183-193
[8] Hidayat D, Ade. D. S, Yulisma. 2013. Kelangsungan hidup, pertumbuhan dan efesiensi pakan ikan gabus (*Channa striata*) yang diberi pakan berbahan baku tepung keong mas (*Pomacea* sp). *Jurnal Akuakultur Rawa Indonesia*. 1 (2):161–172.
[9] Effendie, M.I. 1997. Biologi Perikanan. Yayasan Pustaka Nusatama. Yogyakarta.
[10] Ang, K.J, A. T. Law dan S.H. Cheah.1989. Nutrition and Culture of the Giant Gouramy (*Osphronemus gouramy* Lac.) in Floating Net Cages. Dalam Aquaculture Research in Management Techniques and Nutrition. Pudoc Wagwningen. Hal. 46-56
[11] Surawidjaja, E. 2006. Akuakultur Berbasis "Trophic Level": Revitalisasi untuk Ketahanan Pangan, Daya Saing Ekspor dan Kelestarian Lingkungan.Fakultas Perikanan dan Ilmu Kelautan, IPB. Bogor.
[12] Susanto, H. 1987. Budidaya Ikan Di Pekarangan. Penebar Swadaya, Jakarta
[13] Saputra I., Putra WKA, Yulianto T. 2018. Conversion rate and feed efficiency of Silver Pompano Fish with different frequency giving. *Journal of Aquaculture Science* 3(2):171-180

[14] Zulkhasyni F, Sari R. 2016. Pemberian pakan buatan dengan dosis berbeda untuk pertumbuhan dan kelangsungan benih ikan putih dalam upaya domestikasi. *Jurnal Agroqua* 14(2):49-55

[15] Hanief R, Subandiyono P. 2014. Pengaruh frekuensi pemberian pakan terhadap pertumbuhan dan kelulushidupan benih tawes. *Journal of Aquaculture Management and Technology* 4:67-74