

# Identification of Natural Food in the Digestive Tract of 1-3 Cm Kotes (*Channa gachua*) Seeds in Some Ponds in Malang Area

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## ABSTRACT

The purpose of this study was to identify the type of food present in the digestive tract of 1-3 cm Kotes fry found at the test site. The test parameters used in this study included calculating the total length and weight of the fish, calculating the width of the fish's mouth opening, measuring the length and weight of the digestive tract of fish, observing the amount and type of food in the digestive tract, observing plankton in the waters of the study site, collecting and identification of the benthic from the study site, observation of temperature, pH and dissolved oxygen as well as data analysis which includes the method of occurrence frequency and the ratio of the length of the digestive tract to the total length of the fish. Types of food found in the digestive tract of Kotes fry measuring 1-3 cm include *Navicula* sp, *Scenedesmus* sp, *Branchionus* sp, *Cyclops* sp, *Daphnia* sp, *Aedes* sp larvae, *Chironomus* sp larvae. The results of the frequency of occurrence showed that the most dominant food was *Chironomus* sp Larvae with a value of  $68.03 \pm 8.68\%$ . Judging from the ratio of the length of the digestive tract to the body length of the Kotes fry, a value of  $0.52 \pm 0.015$  was obtained. This value indicates that the Kotes fish fry measuring 1-3 cm are classified as carnivorous fish. The results of observations of water quality at the test site were for temperatures ranging from  $18.75 \pm 1.160\text{C}$ - $30.37 \pm 1.060\text{C}$ , a pH value of 6 and a dissolved oxygen value between  $1.86 \pm 0.43$ - $6.56 \pm 1.01$  mg/litre.

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## 1. INTRODUCTION

Paddy field is a system of plant cultivation that is distinctive in terms of the type of plant, namely rice, soil preparation, water management and its impact on the environment. Paddy fields must have more attention in the land use system (Notohadiprawiro, 2006). Along with economic development and population growth, there has been a sharp increase in competition for the use of land resources.

Rice fields have functions in terms of environmental preservation, namely: (1) reducing the chance of flooding, (2) maintaining the balance of water circulation, especially in the dry season, (3) reducing air pollution due to industrial pollution, and (4) reducing environmental pollution through the return of organic fertilizer in paddy fields. Meanwhile, innate benefits consist of two interrelated elements: (1) as a means of education, and (2) as a means to maintain biodiversity.

Judging from the role of rice fields as a defense of biodiversity, it is very important if rice fields are to be maintained. This is related to the survival of organisms in it. One type of fish that lives in rice fields is Kotes fish (*Channa gachua*). This fish is native to fresh waters in the tropics, including Indonesia. Kotes fish have an elongated lateral body shape. Head and back more or less straight, mouth type terminal, number of spines on the dorsal fin is 32-37, scales on the linea lateralis 39-48, pelvic fins are shorter than the length of the pectoral fin which is half-moon-shaped, spines on the pectoral fin are a total of 15-17, anal fin spines 21-27 and caudal fin 12.

The maxilla and premaxilla extend several levels above the nostrils. Kotes fish can be found in waters with running water and not more than 25 cm deep with muddy bottom conditions. This fish is able to tolerate a wide pH range with a 100% survival rate for 72 hours at a pH of 3.10 to 9.6. This fish is basically a carnivorous fish, usually eating smaller fish, mosquito larvae, crustaceans. Snakehead fish has a position as the top of the food chain in its habitat. Apart from habitat destruction, the decline in Kotes fish populations is also caused by increased hunting, as the demand for fish increases.

The increase in demand was due to the presence of albumin in Kotes fish. Albumin itself has the function of accelerating the wound healing process in humans. This increasing demand for serum albumin is one of the reasons for increased hunting which has led to a reduction in the Kotes fish population in nature. One form of preventing the loss of this fish is cultivation. There is no information about how to cultivate it, so it is necessary to take domestication steps so that information related to how to cultivate these fish is collected. Analysis of the food contained in the digestive tract and comparison with the food found in its habitat needs to be done to find out the food needed.

The digestive process in living organisms involves digestive organs or tools and digestive glands. Fish digestive organs will differ between herbivorous, omnivorous and carnivorous fish. Anatomically, the structure of the digestive tract in fish is closely related to body shape, food habits and eating habits (fish category) and age. Digestive organs in fish generally consist of the mouth, oral cavity, pharynx, esophagus, stomach, intestine, rectum and anus. In order to study the study of eating habits in fish, the digestive organ that is usually used is the stomach.

## **2. METHOD**

### **2.1 Types of research**

The research method used is the experimental method. According to Nazir (2005), experimental research is research conducted by manipulating the object of research and the existence of controls. The purpose of experimental research is to investigate whether there is a causal relationship and how big the causal relationship is by giving certain treatments to several experimental groups and providing controls for research. .

### **2.2 Research variable.**

The main variables in this study were the number of *V. harveyi* bacteria and the survival of the vanname shrimp (*L. vanname*), while the supporting parameters used were water quality including temperature, DO, pH and salinity.

### **2.3 Research design**

The experimental design used in this study was a Completely Randomized Design (CRD), which is a design used for experiments that have uniform media or experimental sites.

### **2.4 Sampling location**

This research was carried out with samples of *B. firmus* bacteria through vanname shrimp rearing media to reduce the number of *V. harveyi* bacteria and the stimulation between the two research test materials.

### **2.5 Time and Place of Research.**

This research was conducted at the Laboratory of Disease and Environmental Health, Situbondo Brackish Water Aquaculture Center, from June to August 2009.

### **2.6 Tools and materials**

The tools used during the research are as follows: Laminar Air Flow (LAF); Vortex; One set of autoclave sterilizer; Effendorf tube; Bunsen; Electric heater; Petridisk; Refrigerator; Dropper pipette; Measuring cup; Micropipette; Erlenmeyer; Tri angel; Digital scale; Colony Counter; Incubator; Test tube; Tank capacity of 15 liters; Test tube rack; Loop needle; Aerator, aeration stone, hose; Water quality test equipment: pH meter, DO meter, refractometer, thermometer.

The materials used during the research are as follows: Vannamee shrimp (*L. Vannamei*) PL 4, obtained from vannamee shrimp hatcheries around the Situbondo Brackish Water Cultivation Center (BBAP); *B. firmus* isolate, obtained from vannamee shrimp ponds in Gresik area; Isolate of *V. harveyi*, which was obtained from the Laboratory of Fish and Environmental Health BBAP Situbondo; TCBSA Media (Thiosulphate Citrate Bile Sucrose Agar); TSA Media (Tryptic Soy Agar); NB Media (Nutrient Broth); Alcohol; KCl; MgSO<sub>4</sub>; NaCl; Aquades; Aluminum foil; Vannamee shrimp rearing media water.

### 2.7 Research procedure

The tools to be sterilized are wrapped using parchment paper or newsprint, then tied with thread, while media such as TSA and TCBSA are put into the Erlenmeyer and covered with cotton and aluminum foil. Then it is put into the autoclave and filled with sufficient water. It is continued with the preparation of trisalt solution and other media and the calculation of bacteria to meet the applicable requirements and finally the shrimp maintenance and observation.

### 2.8 Data analysis.

The data obtained from the results of the treatment in the study were analyzed to determine the effect of the treatment on the response of the parameters being measured. The analysis uses analysis of variance or the F test. If the F value shows a significantly different (significant) effect then proceed with the BNT test (Small Significant Difference). The final results of BNT can be followed by regression analysis which provides information about the effect of the best treatment on the response.

## 3. RESULTS AND DISCUSSION

### 3.1 Research result

#### 3.1.1 Ratio of Digestive Tract Length to Total Body Length of Fish.

The results of measurements of total body length, length of the digestive tract of fish and body weight and weight of the digestive tract of Kotes fry during the study. The results of measurements of 48 Kotes fish observed during the study had a total body length range of 1.55-3 cm. The ratio of the length of the digestive tract to the body length of Kotes fingerlings ranged from 0.32-0.89 cm with a total average value of  $0.52 \pm 0.015$  cm. This means that the length of the digestive tract of the Kotes fish is  $0.52 \pm 0.015$  times the body length. Looking at the results of calculating the ratio of the length of the digestive tract to the total body length of the Kotes fish, the Kotes fish can be classified as carnivorous fish (meat-eating animals). Fish communities can be grouped into 3 groups, namely herbivorous or detritivore fish, carnivores and omnivores based on the food they eat. Groups of herbivorous or detritivore fish tend to eat detritus and plankton as their main food. In contrast to herbivorous fish, the omnivorous fish group is more likely to eat natural foods in the form of aquatic insects, shrimp, fish fry and aquatic plants (all eaters).

Table 1. Abundance and amount of food found at the test site

Types of Organisms	Frequency of occurrence (%)		
	Spring pool average Lab intensive. Sand source	Ground pool gondang hamlet, stone city	Pool deposition Lab. Reproduction
Phytoplankton (cells/ml)			
Centropyxis sp			
Diatoma sp	2	-	-
Euglena sp	6	7	9
Fragilaria sp	-	-	-
Golenkinia sp	9	4	-
Navicula sp	12	8	5
Pediastrum sp	-	36	-
Skenedesmus sp	16	5	4
Spirulina sp	-	-	-
Volvulina sp	-	22	-
Zooplankton (indv/ml)			
Branchionus sp	7	10	-
Cyclops sp	13	2	2
Benthos (heads/m <sup>2</sup> )			
Chironomous sp. larvae	220	137	137

Pila sp	10	15	10
Nekton (heads/m <sup>3</sup> )			
Clarias sp	3	-	-
Oreochromis sp	2	-	6
Pangasius sp	2	-	-
Poecilia sp	-	47	-
<b>TOTAL</b>			<b>100%</b>

### 3.1.2 Abundance of Food found

The results of research on the abundance of food found in irrigation canals where they are kept and in the stomachs of Kotes fish. The results of observing the type of food and the frequency of its occurrence in the stomach of Kotes fish (*Channa gachua*) fry.

**Table 2.** Data on the frequency of occurrence and food found in Kotes (*Channa gachua*) seed digestive tract

Types of Organisms	Frequency of occurrence (%)			
	Spring pool average Lab intensive Sand source	Ground pool gondang hamlet, stone city	Pool deposition Lab. Reproduction	Average
Phytoplankton (cells/ml)				
Navicula sp	4.35	-	-	1.45±2.51%
Skenedesmus sp	4.35	-	-	1.45±2.51%
Zooplankton (indv/ml)				
Branchionus sp	17,39	-	-	5.80±10.04%
Cyclops sp	4.35	16,67	11,11	10.71±6.17%
Dephania sp	-	5.56	-	1.8 ±3.2%
Benthos (heads/m <sup>2</sup> )				
Aedes sp. larvae	4.35	-	-	1.45±2.51%
Chironomous sp. larvae	65,21	61,11	77,78	68.03±8.68%
Blank	-	16,67	11,11	9.26±8.49%
<b>TOTAL</b>				<b>100%</b>

Types of food found in the digestive tract include zooplankton and benthos. Based on the results above, it can be said that Kotes fish seeds are carnivorous fish. These results were also strengthened by observations of the ratio of the length of the digestive tract to the body length of the fish, which is half of the body length. Foods commonly found in the digestive tract include hair worms (*Tubifex tubifex*), Chironomous larvae (*Chironomous sp*), *Caridina shrimp* (*Caridina sp.*), earthworms (*Lumbryscus sp*), and mosquito larvae (*Aedes sp*) and fish (Silva, 1988). Kotes fish in their natural habitat are classified as carnivorous fish that only eat live animals. This fish eats all animals such as smaller fish, insects, shrimp, frogs and even turtle cubs.

### 3.2 Discussion

Kotes fish in their natural habitat are classified as carnivorous fish that only eat live animals. This fish eats all animals such as smaller fish, insects, shrimp, frogs and even turtle cubs. These fish are given food in the form of shrimp and small fish in the aquaculture treatment (Lee et al., 1994 in Norainy 2007). In the broad intestine this absorption area is related to the length of the intestine, the height of the villi, the distribution of microvilli and the presence of pyloric caeca. Herbivorous fish have intestines several times longer than their body length, while carnivorous fish generally have intestines that are sometimes shorter than their body length. The presence of microvilli on the surface of the principal cells (enterocytes) means that it also expands the absorption area. The observed temperature at the three test locations ranged from  $18.75 \pm 1.16$  °C-  $30.37 \pm 1.06$  °C. Lee et al. (1994) in Courtney et al. (2004) stated that the *Channa gachua* fish has a tolerance for hot temperatures in spring in Sri Lanka to low temperatures of 13°C.

However, there are reports stating that these fish are found in northern Afghanistan (subtropical) to Kalimantan and Java (tropical). Observations of dissolved oxygen at the test site obtained a range of values between  $1.86 \pm 0.43$ - $6.56 \pm 1.01$  mg/liter. Kotes fish are able to live in the waters at the test site even with a wide range of dissolved oxygen conditions. This condition is because the Kotes fish have an additional breathing apparatus that allows them to take air from the surface of the water. The ideal dissolved oxygen content for fish life is 4 mg/liter. Snakehead fish can live in still waters with low oxygen conditions and turbid waters (Nevertheless and Pethiyagoda, 1991 in Courtenay et al., 2004). An increase in temperature to the optimum in the waters stimulates the growth of phytoplankton which is also followed by zooplankton which also means an increase in the amount of natural food in these waters. With

the optimum temperature, feeding speed, metabolism and fish growth also increase supported by the presence of food in the waters, the growth rate of fish is also accelerated.

#### 4. CONCLUSION

Based on the results of this study, it can be concluded that the types of food found in the digestive tract of 1-3 cm Kotes fry include *Navicula* sp, *Scenedesmus* sp, *Branchionus* sp, *Cyclops* sp, *Daphnia* sp, *Aedes* sp larvae, *Chironomus* sp larvae. With an average frequency of successive events of  $1.45 \pm 2.51\%$ ,  $1.45 \pm 2.51\%$ ,  $5.80 \pm 10.04\%$ ,  $10.71 \pm 6.17\%$ ,  $1.85 \pm 3.2\%$ ,  $1.45 \pm 2.51\%$ ,  $68.03 \pm 8.68\%$ , and  $9.26 \pm 8.49\%$ . The results of the frequency of occurrence showed that the most dominant food was *Chironomus* sp Larvae with a value of  $68.03 \pm 8.68\%$ . and seen from the ratio of the length of the digestive tract to the body length of the Kotes fry, a value of  $0.52 \pm 0.015$  was obtained. This value indicates that the Kotes fish fry with a size of 1-3 cm are classified as carnivorous fish and the results of observations of water quality at the test site are for temperatures ranging from  $18.75 \pm 1.160\text{C}$ - $30.37 \pm 1.060\text{C}$ , a pH value of 6 and a dissolved oxygen value between  $1.86 \pm 0.43$ - $6.56 \pm 1.01$  mg/liter.

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There is a need for further research using food from the zooplankton type in order to find out more clearly and tested about the food preferences of the Kotes fish and it requires determining the right feed formulation based on the most dominant food content from the results of this study which can later be used to make artificial food to fulfill the need for Kotes fish cultivation in search of Kotes fish seeds in nature should be carried out from May to July and October to December.

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