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Nilem (Osteochilus vittatus) fecundity performance in the districts of Cianjur, Tasikmalaya, and Kuningan, West Java, Indonesia

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Research Article

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ABSTRACT

fecundity performance in the districts of Cianjur, Tasikmalaya, and Kuningan, West Java, Indonesia. J Agric Asian 1: 17–21. Understanding the reproductive characteristics of nilem (Osteochilus vittatus Valenciennes, 1842; syn. Osteochilus hasseltii Valenciennes, 1842) was the goal of this research. The research was carried out between October 2015 and March 2016. Body length, weight, gonad maturity level (GML), and fecundity were all included in this study. From agricultural operations in Cianjur, Tasikmalaya, and Kuningan, West Java, Indonesia, 27 samples were gathered. The association between fecundity and weight, body length and fecundity, and GML were the factors that were observed. The exploratory technique was the strategy used, and a descriptive approach was utilized to examine the data. According to the findings, there was a link of y=e0,024x between weight and fecundity in Cianjur District and y=e0,413x between body length and fecundity. Body length and fecundity were y=e0,4903x in Tasikmalaya District, while y=e0,0728x. The relationship between fish length and fecundity in Kuningan District was y=e0,2902x, while y=e0,6859x. GML IV (50%) was the predominant gonad maturity level of O. vittatus in Cianjur, GML VI (100%) in Tasikmalaya, and GML V (55,56%) in Kuningan. Osteochillus vittatus from Cianjur, Tasikmalaya, and Kuningan District showed a correlation between body weight and length of W=0.03L2.95, W=0.04L2.89, and W=0.04L2.79, respectively. Understanding the ideal size of O. vittatus that can be collected with the best egg volume was the consequence of this study.

Keywords: Fecundity, GML, LW relationship, *Osteochilus vittatus*, West Java

INTRODUCTION

The freshwater fish known as nilem, or Osteochilus vittatus (Valenciennes, 1842), syn. Osteochilus hasseltii (Valenciennes, 1842), is one of the most important fish farming products on Java Island, especially in the Priangan, West Java, regions. However, in recent years, the industry's activities have been steadily replaced by other growing sectors that are comparable to it (Subagja et al. 2006). In contrast, the fish has favorable traits that make it a profitable business, as seen by the excellent fertility of its eggs. Both enhanced fecundity and reproduction are possible with O. vittatus. 15,000–30,000 eggs might be produced by a pair of fish weighing 100–150 g (Yudhistira 2013). As the fish's length and weight increase, its fertility may similarly rise in logarithmic patterns. The flavor of the eggs has led to their widespread consumption, and they are exported to several nations as a substitute for caviar. Fish length-weight correlation measurements reveal that the fish's standardized size at different sites is correlated with both length and weight. This measurement is used to determine the species' characteristics. To determine the growth rate, this association is crucial information (Isa et al. 2010). Additionally, it is one of the elements taken into account when deciding on fisheries management plans (Mansor et al. 2015).In West Java, the District of Ciamis and Tasikmalaya are the primary hubs for O. vittatus farming and industry (Department of Fisheries and Marines, West Java 2010). The goal of this study was to identify O. vittatus's reproductive development pattern, which includes fecundity, gonad maturity level (GML), length-weight correlation, and management techniques for producing the most eggs possible for the "egg crispy cookies."

Fish body weight and overall length are associated with fecundity. The quality of eggs and the timing of reproduction are significantly influenced by the environment, particularly the availability of food in the habitat. Low fecundity may occur from a delay in the gonad's development brought on by malnutrition. Fish condition, growth, and population density may all be influenced by their food and nutrition. A species' eating habits are often influenced by the fish's age, environment, time, and digestive system (Syandri et al. 2015).

MATERIALS AND METHODS

This research was conducted from October 2015 to March 2016. Fish samples were taken from 3 different farming locations (Muchlisin et al. 2015) i.e., Cianjur, Kuningan, and Tasikmalaya in the West Java Province (Figure 1). Samples were observed and identified in the Laboratory of Aquaculture, Faculty of Fisheries and Marines, Universitas Padjadjaran, Sumedang, West Java, Indonesia.

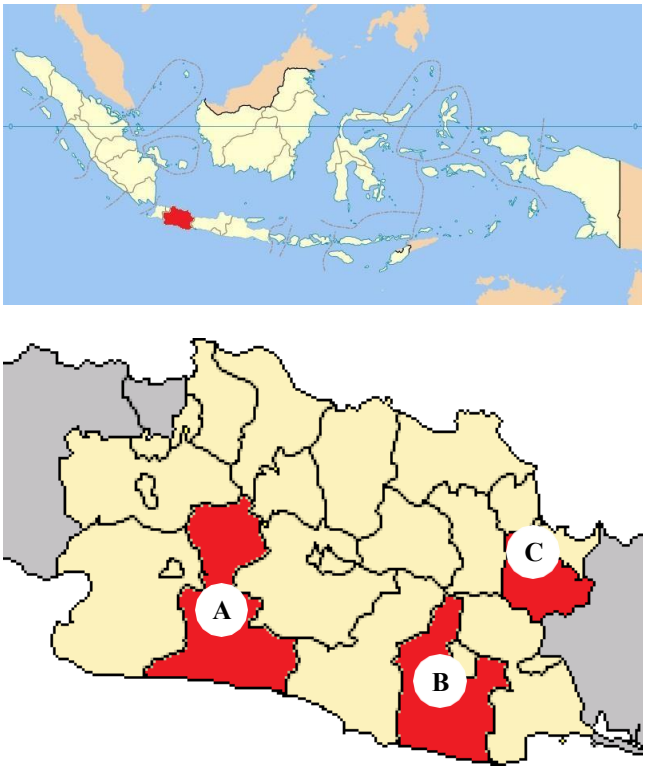

Figure 1. Research area in West Java, Indonesia (red color). A. Cianjur, B. Tasikmalaya, and C. Kuningan

The female breeder consists of 27 fish taken and froze for further observation in weight (in gram), length (in centimeter) and gonad maturity level (GML). Identification of Gonad Maturity Level refers to Kesteven (Bagenal and Braum 1968). Number of eggs was counted by gravimetric method. Fecundity was measured with the following formula (Effendie 1979):

$$F = \frac{G.x}{g}$$

Note:
F = fecundity;
x = number of sampling eggs; G = total gonad weight (g);
g = sample gonad weight (g)

The length-weight correlation was analyzed using the following formula (Effendie 1979; Brodziak 2012): $W = a\ L^{b}$

The linearization could be done through logarithmic transformation using the following equation:

Log W = Log a + b Log L Note
W = weight (g) L = length (mm)
a = Intercept (curved intersection of length-weight correlation with the y-axis)
b = Length-weight coefficient assumption

RESULTS AND DISCUSSION

Reproductions aspect

The following are the results from the observation and treatment of the sampling in Cianjur, Kuningan, and Tasikmalaya that include total length (TL), body weight, gonad weight, gonad maturity level (GML), and fecundity (Table 1).

Fecundity

Fecundity is the number of eggs per unit of weight or length (Effendi 1979). The ovary weight may be resorted to make a presumption of the fecundity to get the expected results (Murtejo 2008). The observed fish weighed approximately 108-418 g, and the fecundity is 26,200- 123,880 eggs and the gonad weight range is 25-95 g (Table 1). The fecundity level in this research fluctuated possibly due to the age and size differences of the fish that results in the variation of the number of fecundity. It means that the bigger the fish, the higher the fecundity. Longer fish also tended to have higher fecundity (Figure 2-4). Fish with the highest fecundity (total length of 28.5 cm) is in the GML VI (the spawning period).

It is also noted that the fish weight measurement is more reliable to presume the fecundity than the total body length. Absolute fecundity is often shown by the relation to the body weight, as it could approach the fish condition better than their body length (Effendie 1979). The relationship between fecundity and weight (Figure 5-7) appears as in general; heavy fish also have high fecundity, even the highest fecundity (weight 373 g) in this research is achieved by fish in the spawning GML. Fluctuation occurs due to the age difference and the intensity of the spawning.

Table 1. Average reproductions aspects of *O. vittatus* in Cianjur, Tasikmalaya and Kuningan, West Java, Indonesia

Sample origin	TL (cm)	SL (cm)	Weight (g)	Gonad (g)	GML	Fecundity (eggs)
Cianjur	21.1	17.30	139.8	29.8	GML IV-V	30418
Tasikmalaya	27.4	22.16	356.0	72.3	GML VI	88954
Kuningan	10.6	7.84	20.9	8.62	GML IV-VI	109530

Note: TL = total length, SL = Standard length, GML = gonad maturity level

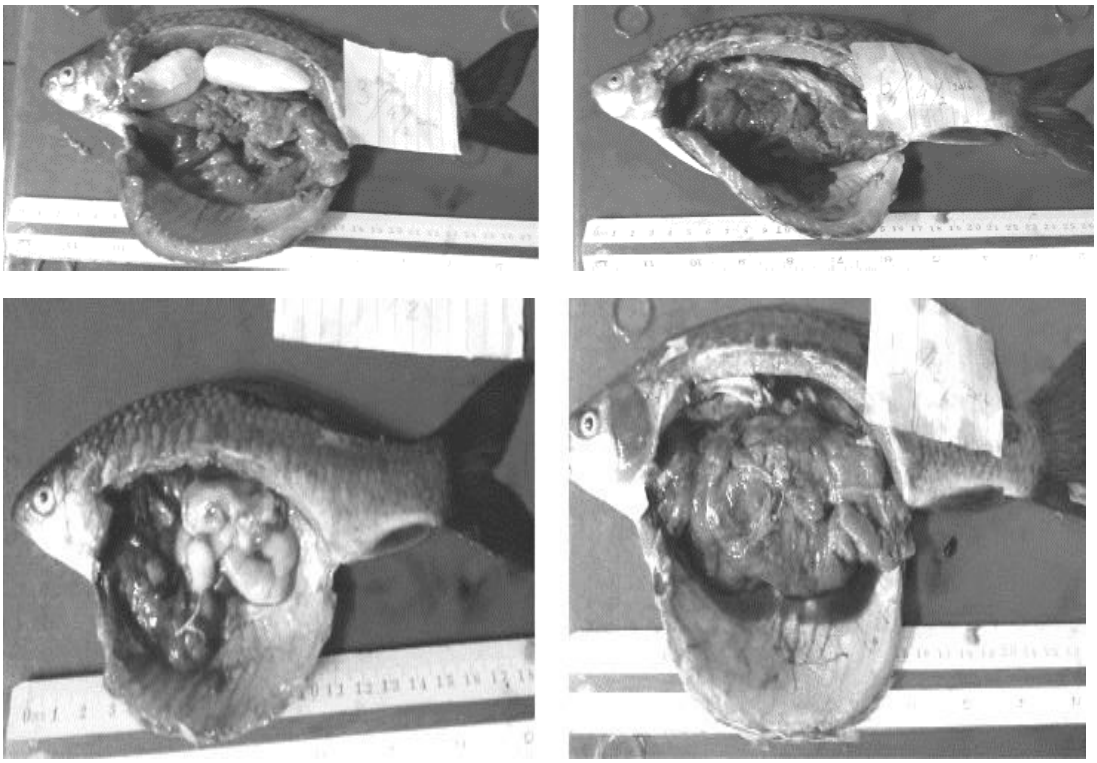

Figure 2. Egg profile of *Ostechilus vittatus* from Cianjur District, West Java, Indonesia

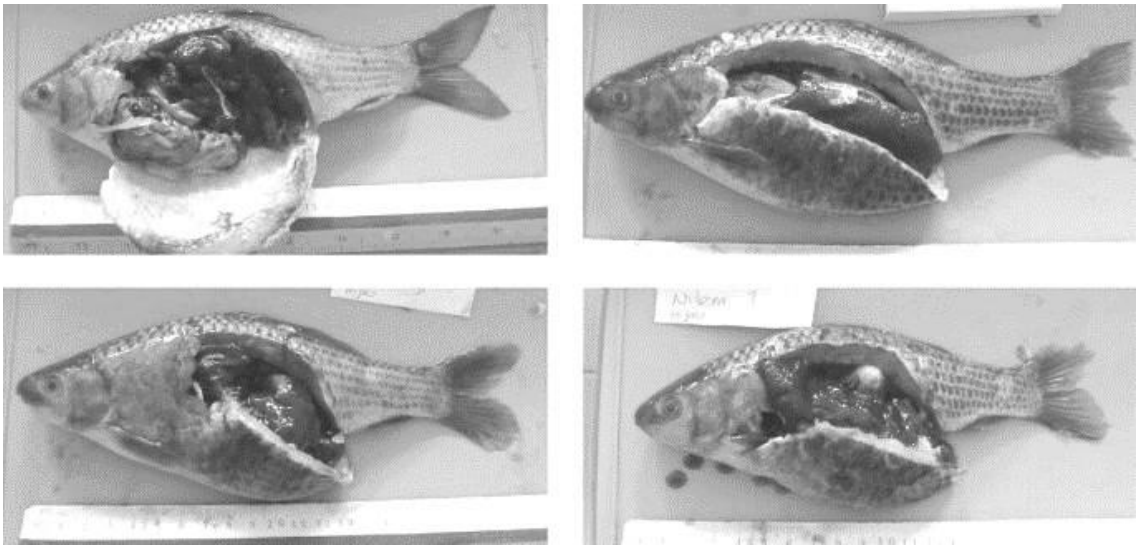

Figure 3. Egg Profile of *Ostechilus vittatus* from Tasikmalaya District, West Java, Indonesia

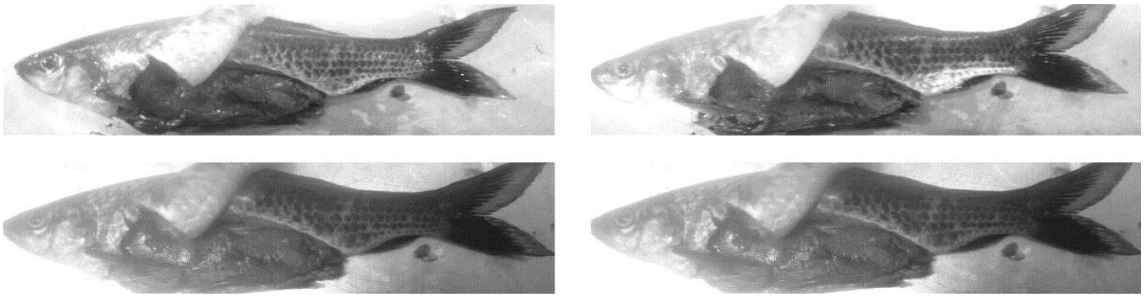

Figure 4. Egg profile of *Ostechilus vittatus* from Kuningan District, West Java, Indonesia

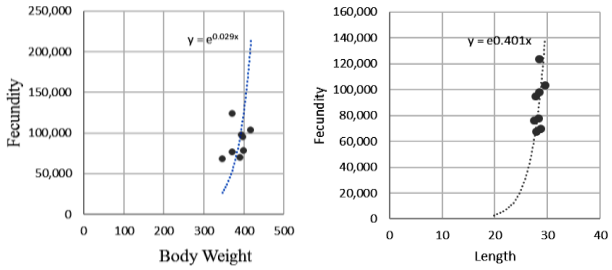

Figure 5. The relationship between body weight and fecundity (*left*) and the relationship between length and fecundity (*right*) in Cianjur District, West Java, Indonesia

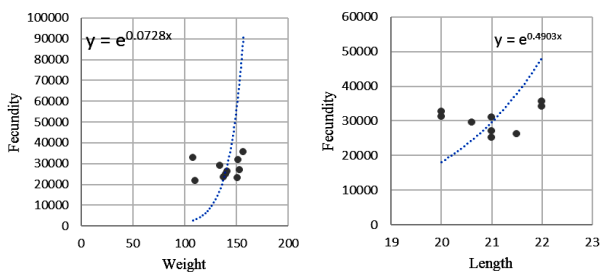

Figure 6. The relationship between body weight and fecundity (*left*) and the relationship between length and fecundity (*right*) in Tasikmalaya District, West Java, Indonesia

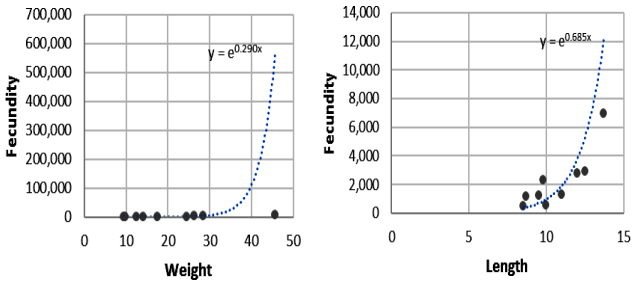

Figure 7. The relationship between body weight and fecundity (*left*) and the relationship between length and fecundity (*right*) in Kuningan District, West Java, Indonesia

Table 2. Average gonad maturity level of *Osteochilus vittatus* in Cianjur, Tasikmalaya and Kuningan districts, West Java, Indonesia

Districts	Gonad Maturity Level (GML)
Cianjur	VI (100%)
Tasikmalaya	IV (50%)
Kuningan	V (55,56%)

Table 3. *Osteochilus hasseltii* length and weight relationship in Cianjur, Tasikmalaya and Kuningan districts, West Java, Indonesia

District	WL relationship	a value	b value	R^2
Cianjur	$W=0.03L^{2.95}$	0.03	2.95	0.94
Tasikmalaya	$W = 0.04L^{2.89}$	0.04	2.89	0.93
Kuningan	$W = 0.04L^{2.79}$	0.04	2.79	0.95

Distribution of Gonad Maturity Level (GML) in Cianjur is in the range of 22-25 cm length at the level of GML VI of 100%. The length of the fish in Tasikmalaya had a range from 16 to 18 cm at GML level IV, V and VI, but dominated on GML IV at 50%. The length of the fish in Kuningan ranged from 6.5 to 7.4 cm both at the level GML IV, with the size 8.3 to 10.2 at GML V and 11-13 at GML VI but dominated at GML V that is equal to 50% (Table 2). This is in line with research by Rochmatin et al. (2015) which examines the aspects of the growth and reproduction of fish in Rawa Pening, Semarang showing the average GML V.

Length-weight correlation

One way to think about weight is as a function of length. The growth pattern may be determined by examining the fish's length-weight correlation. Additionally, the fish's body fatness or thinness might be seen (Effendie 1997). According to Effendie (1979), the equation W = aLb may be obtained by plotting the length and weight in an image. The square value of b, a constant, illustrates the development trend. The fish water condition factor may be examined using the length-weight correlation. The water ecosystem is in better shape when the b value is higher. The constant b value may be used to determine the length-weight correlation; for example, if b = 3, the resulting correlation is isometric, meaning that weight increase and length are balanced. The association is allometric if b ≠ 3, and positive allometric if b > 3, indicating that weight increase is outpacing length and indicating a plump body type. If b is less than 3, the correlation is allometric negative, indicating a bony body type where length increases more quickly than weight growth (Effendie 2002).The length-weight correlation investigation revealed that the correlation equation in Cianjur is W = W=0.03L2,95, in Tasikmalaya it is W = 0.04L2.89, and in Kuningan it is W = 0.04L2.79. The fish from the sample region exhibit a negative allometric development trend, as shown by the b value (Table 3). This is in line with the Natuna Sea's blue mackerel (Scomber australasicus) growth trend, which indicates that length increases more quickly than weight (Nugroho et al. 2013). In a similar vein, Nehemia et al. (2012), who studied freshwater tilapia, found that the b value was 2.94. Furthermore, freckled hawkfish (Ambassis kopsii) and flathead gray mullet (Mugil cephalus) have a negative allometric growth trend (Mulfizar et al. 2012). Environmental circumstances, variations in fish stocks within the same species, developmental stage, sex, gonad maturation, and even temporal disparities brought on by climatic changes are some of

the variables that contribute to variations in b values, according to Bagenal and Braum (1968). The length-weight correlation's R2 values in different districts range from 0.93 to 0.95, indicating a strong relationship between the data. This is consistent with study reports by Satrawaha and Pilasamorn (2009), where the R2 was close to 0.95, and Koffi et al. (2014), where the R2 was scored between 0.46 and 0.94. In conclusion, the connection between Osteochillus vittatus from Cianjur's fecundity and body weight The growth was allometric negative in Tasikmalaya and Kuningan District, where y = e0,024x, y = e0,0728x, and y = e0,2902x b < 3. Osteochillus vittatus from Cianjur, Tasikmalaya, and Kuningan district had a fecundity-body length relationship of y=e0,413x, y=e0,4903xy=e0,6859x. GML IV (50%), GML VI (100%), and GML V (55,56%) are the GMLs of Osteochillus vittatus in Cianjur, Tasikmalaya, and Kuningan, respectively. Osteochillus vittatus from Cianjur, Tasikmalaya, and Kuningan District had the following relationships between length and body weight: W=0,03L2,95, W=0.04L2.89, and W=0.04L2.79. With eggs of the ideal volume, the O. vittatus from Kuningan turned out to be the ideal size for use as a sample fish.

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