

## REPRODUCTION ASPECTS OF THE “SEPETANG” CLAM (*Pharella acutidens*) IN DUMAI MANGROVE ECOSYSTEM, RIAU

by:

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### Abstract

The *Pharella acutidens* population in Dumai mangrove ecosystem was decreasing due to increase in exploitation and mangrove degradation. This research aims to study the reproduction aspects and spawning season of the “sepetang” clam (*Pharella acutidens*). This study was carried out for 12 months, from November 2010 to October 2011 at Dumai mangrove. The “sepetang” clam samples were collected monthly from the Dumai mangrove ecosystem, from three stations. The clam were collected through sampling plots, 1 m x 1 m quadratic transects. Reproductive aspects such as sex ratio, gonadal development, gonadosomatic index (GSI), fecundity and oocytes diameter were studied. Results shown that sex of the “sepetang” clam can be determined at the size of more than 35 mm. Male and female ratio was 1 : 1.12 and no hermaphroditism observed. Histological analysis indicated that *P. acutidens* had four distinguishable gonad development in male and female clam, namely early active, late active, ripe and partially spawned. The fecundity increase as shell length increase and it correlated significantly with shell length. Mean oocytes diameter does not show any monthly pattern, except on May to June, the mean of oocyte diameter was relatively small. Based on gonadal development, GSI and mean oocyte diameter, the “sepetang” clam probably spawn continuously throughout the year with a peak spawning season between May-June.

*Keywords* : “sepetang” clam, reproduction, sex ratio, gonadosomatic index

### 1. INTRODUCTION

*Pharella acutidens* Broderip and Sowerby, 1828 is one of bivalve that commonly inhabit mangrove ecosystem. Carpenter and Niem (1998), stated that *P. acutidens* belonged to Order Veneroida, Family Solenidae (Cultellidae) and Genus *Pharella*. In Riau, this clam known as “sipetang or sepetang” (Tanjung 2005; Disnakkana Kota Dumai 2008). This clam is protein resources for local people and it consist of 13.25% protein (Tanjung, 2005). Eventhough it has no high economical value, this clam has important ecological role, as it holes allow the oxygen to enter soil. Consequently, the oxygen content in the soil increase. This clam is filter feeder and it's feeding habit improve the clearness of the water.

Local people that live around the Dumai mangrove area used to get the sepetang clam from the mangrove. However, they stated that nowadays, the clam population decrease. Decrement of the clam population may relate to habitat changing, or over-exploitation. Pollutant originated from industries, harbor and households in Dumai may negatively affect the mangrove





In this study, gonad of the clam can be identified when the clam achieve the minimum size of 35 mm BL. The sepetang clam is *dioecious* and there is no sign of hermaphroditism. The sex of this clam is unique, as it is different from other clam. Afiati (2007) stated that the male gonad of *Anadaragrana* is smooth, whitish and transparent, while that the female is small granulated and pink reddish colored. Mzighani (2005) mentioned that the mature gonad of female is bright orange, while that of the male is white. According to Nabuaband del Norte-Campos (2006) it is very difficult to distinguish the gonad of *Garielongata* macroscopically.

Sex ratio of male and female of sepetang clam in each station is 1 : 1.12 (Table 1). These data indicate that there is no affect of environmental condition on the sex ratio of the clam.

Table 1 Sex ratio of sepetang (*P. acutidens*) clam in Dumai mangrove

Station	Male	Female	Unidentified	Sex Ratio	$\chi^2$
St 1	152	172	69	1.13	1.11
St 2	111	108	39	0.97	0.04
St 3	104	132	50	1.27	3.32
Average	122	137	53	1.12	2.60

The sex ratio of the sepetang clam is similar to that of *Anodontiaedentula* (Natan, 2008) obtained from the Ambon Bay and also similar to *Siliquapatula* (Nickerson in Lassuy and Simons, 1989); *Anadarainaequivalvis* (Sahinet al., 2006); *Tapes decussatus* (Serdaret al., 2010); *Tapes decussatus* (Nabuaband del Norte-Campos, 2006). The sex ratio affects the population of organisms. If the number of male is lower than that of the female, the possibility of sperms in fertilizing the eggs also low and as a consequence many eggs may not be fertilized.

Based on Gribben (2005), 4 gonadal maturity levels were determined in the sepetang clam, they were *early active*, *late active*, *ripe* and *partially spawned* (Figure 2). In this study, however, there was no clam with *spent* gonad (after spawning) and *resting* (inactive) stage. This condition indicates that sepetang clam may not spawn all of gamete content in the gonad. It is predicted that the clam may spawn part of the ripe gametes and produce the ripe gametes throughout the year (Figure 3). As a consequence the mature gametes are always present in the gonad and thus the gonad is never in *spent* or *resting* stages. The *early active* stage gonad was found in the small clam (<40 mm BL) only. Similar spawning pattern is identified in *Anadaragrana* and *A. antiquata* (Afiati, 2007), *Anodontiaedentula* (Natan, 2008) and *Tapes decussatus* (Serdaret al., 2010).

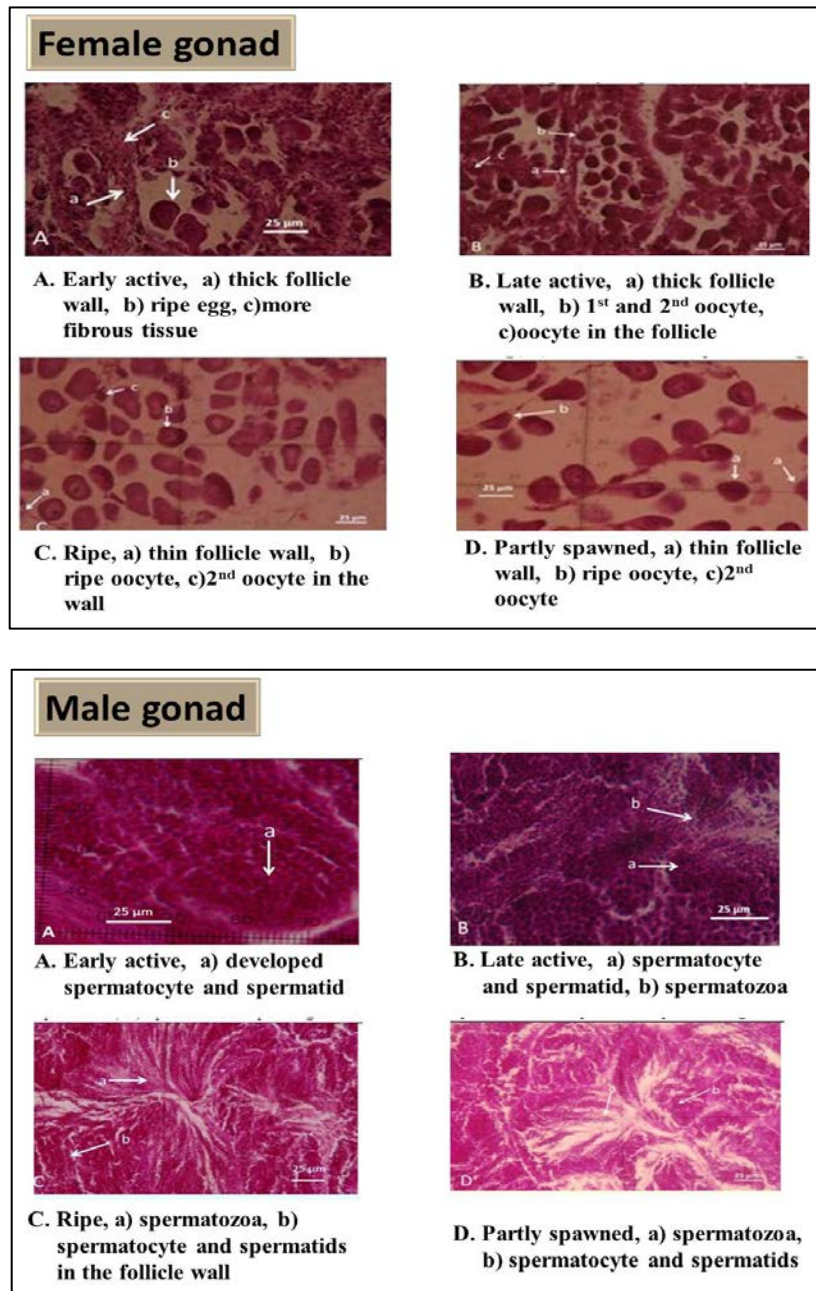


Figure 2. Developmental stage of male and female *P. acutidens* gonad.

Histological structure of the gonad also shown that there are sperm and ova in several developmental stages, and it is proved that the clam is never spawn all of mature gametes from the gonad. This fact indicate that the *P. acutidens* clam is a *partial spawner* clam. Similar spawning pattern is obtained in *Abraalba* Brien and Keegan (2004). Figure 2 shown the gonad development of *P. acutidens* gonad.

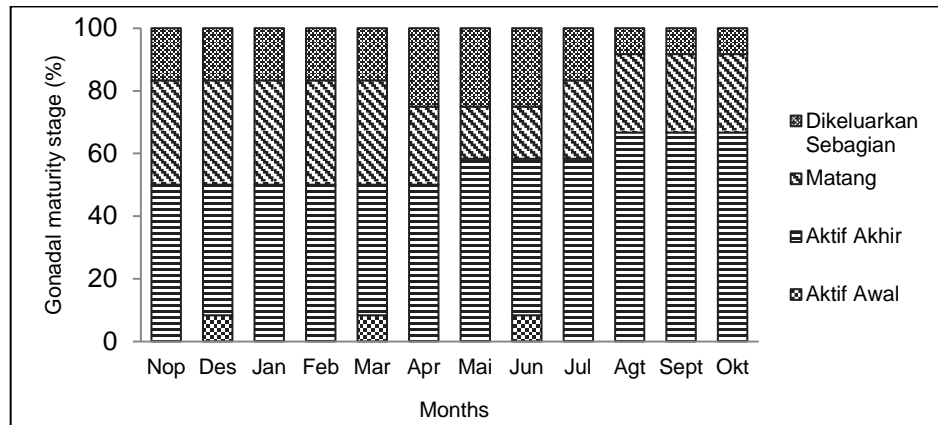


Figure 3. The number of *P. acutidens* (%), based on the gonadal maturity stage.

Gonadal Somatic Index (GSI) of *P. acutidens* was ranged from 5.98% to 12.71% (Figure 4). The GSI of the clam was fluctuated, it was peaked on February and achieved the lowest point on May. Gonad was smaller when the ripe gametes were already spawned and it became bigger when the mature gametes were formed (Figure 4). The fluctuation of the GSI value may be related to weather environmental condition.

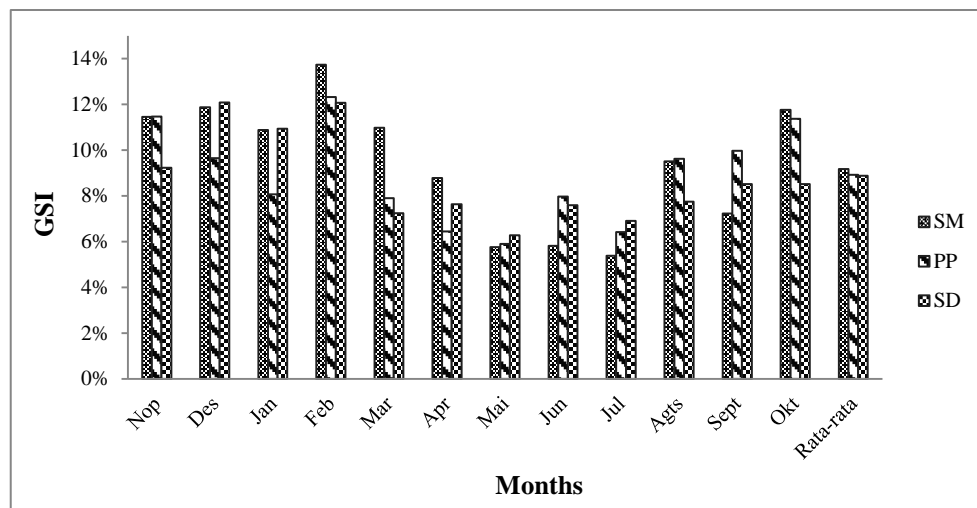
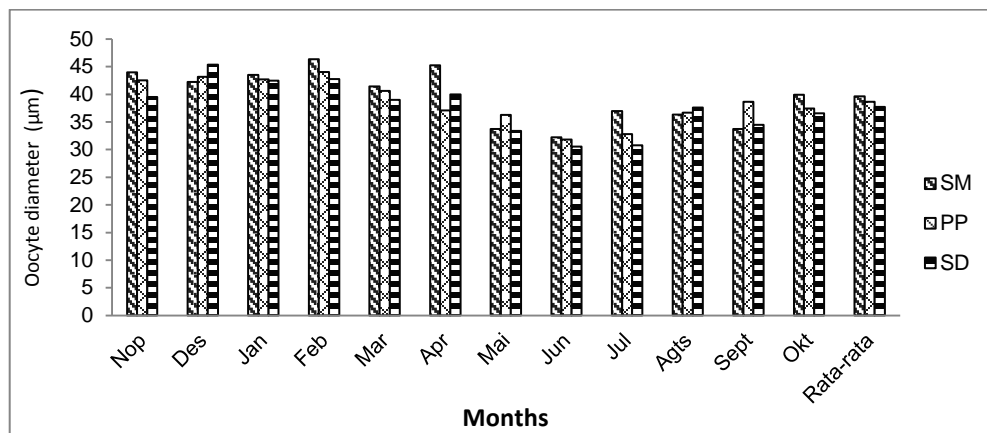


Figure 4. The average of GSI of *P. acutidens* obtained from 3 sampling sites (SM : Sungai Mesjid Rivermouth; , PP: Purnama Beach, SD: Dumai River Rivermouth)

Fecundity of *P. acutidens* was relatively high, ranged from 1,449,655 to 7,537,180 eggs/clam (56.4-84.1 mm BL, 4.74-17.79 g BW). High fecundity was also identified in razor clam from Northwest Pacific (McMillin's in Lassuy and Simons, 1989) and *Haliotis rubra* L (Litaay & de Silva 2003). Litaay & de Silva (2003) stated that the fecundity is related to Body Length and Body weight of abalone. In *A. antiquate*, the fecundity is increased as body length increases (Mzighani 2005).

Oocyte diameter achieves its maximum size as the clam is ready to spawn. The oocyte diameter of *P. acutidens* ranged from 20-56  $\mu\text{m}$  (average 31.5-44.4  $\mu\text{m}$ ). Changes in oocyte diameters throughout the year are presented in Figure 6. Oocyte with the smallest diameter was

found in May to June, while the bigger were present in March-April. Gribben (2005) stated that the oocyte reach its maximum size as it is ready to be spawned.



Gambar7. Oocyte diameter of *P. acutidens* from 3 sampling sites.

#### 4. CONCLUSION

Based on data obtained, it can be concluded that the sex of *P. acutidens* can be identified as the clam reach the minimum size of  $\pm 35$  mm BL. The ovary is whitish, while the testes is light brown. The *P. acutidens* is a dioecious clam, there is no hermaphroditism signs and it is a partial spawner. The sex ratio of male and female is 1 : 1 and spawn continuously throughout the year.

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