



Profile holothuria scabra based reproductive cycle phases full moon and new moon phase

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Key words: *H. scabra*, Asynchronous, phase of the moon, the new moon phase.

<http://dx.doi.org/10.12692/ijb/14.2.227-232>

Article published on February 12, 2019

Abstract

Sea cucumbers are generally spawn in the waters around the neighborhood of his life. Many environmental factors affecting reproductive aspects such as the temperature of sea cucumbers, blooming phytoplankton and the cycles of the moon. Cycles of the moon is one of the environmental factors that can affect the reproductive cycle of sea cucumbers. This study aims to produce the reproductive cycle of *H. scabra* profile as the information in the management and sustainable utilization of *H. scabra* and sustainable. The study was conducted in Langgur Southeast Maluku, laboratory Hatchery and laboratory water quality, fisheries Polytechnic State Tual on January 29, 2017 until October 20, 2017. Observations reproductive cycle of *H. scabra* do macroscopically and microscopically. Take samples of sea cucumbers at every full moon phase (BP) and the new moon phase (BB) as many as 10 individuals. Observations gonad maturity level (TKG) and gonad maturity index (IKG) is based on phases of the moon. Determination TKG and IKG, done by sea cucumbers gonadnya dissected and observed in histology and IKG value calculation. Observation of physical characteristics and chemical biology is done in situ. *H. scabra* sea cucumbers have reproductive patterns asynchronously, allowing it to be able to spawn throughout the year, with peak spawning occurs in the month of May or the stage of BP (90%), and in March, BP phase spawning phase (5) of (70%) , Measurement of environmental parameters (physical-chemical water) during the observation showed physical-chemical parameters aquatic environment are at the optimum conditions for maintenance *H. scabra*, whereas plankton observations conducted every pengukuran environmental parameters.

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Introduction

Sea cucumbers are generally spawn in the waters around the neighborhood of his life. Indications of sea cucumber gonads activities related to the seasonal pattern in the local area so that the sea cucumber spawning occurs throughout the year (Darsono, 1999). Although sea cucumbers in the tropics spawn throughout the year, but there are peak spawning only happens a few months a year. Sutaman (1992) suggested that any kind of sea cucumber has a habit of spawning time different.

Many environmental factors are thought to affect the reproductive aspects such as the temperature of sea cucumbers, blooming phytoplankton and the moon cycle (Mackey, 2001). According Ramofafia *et al* (2003), cycles of the moon is one of the environmental factors that can affect the reproductive cycle of sea cucumbers. Can control the lunar cycle in the sea cucumber spawning by stimulating endogenous hormones (Kubota and Tomari, 1998).

Cycles of the moon appear to collect all the stimuli that can cause sea cucumber spawning. Phases of the moon also plays an important role in the life of the fishing community in determining the tide until the ideal time to catch fish.

This is in accordance with the opinion of Tuwo and Nesa (1992) which states that the state of the temperature in the tropics with ocean water temperatures above 210C allows the gonad maturation and spawning takes place throughout the year. This study aims to produce the reproductive cycle of *H. scabra* profile as the information in the management and sustainable utilization of *H. scabra* and sustainable.

Materials and methods

Time and place

The study was conducted in Langgung Southeast Maluku, laboratory Hatchery and laboratory water quality, fisheries Polytechnic State Tual. The research was conducted from January 29, 2017 until October 20, 2017.

Research design

Observations reproductive cycles performed macroscopic, microscopic and histology based on phases of the moon. Take samples of sea cucumbers at every full moon phase (BP) and the new moon phase (BB) as many as 10 individuals. In addition to observation of gonad maturity level also made observations of biological and physical characteristics of water chemistry.

Variable and measurement methods

Observations gonad maturity level (TKG) and gonad maturity index (IKG) is based on phases of the moon. Determination TKG and IKG, done by sea cucumbers gonadnya dissected and observed in histology and IKG value calculation. Observation of physical characteristics and chemical biology is done in situ.

Data analysis

Stage of gonadal development was observed in all phases of development according to (Jiaxin, 1990). As for knowing the value of using IKG2 IKG (conand, 1981) which is the percentage of gonad weight to body weight after surgery using the equation:

$$IKG_2 = \frac{wg}{W} \times 100$$

Where: IKG: Gonad Maturity Index (%)

wg : gonad weight

W : Body Weight

Results and discussion

Reproductive biology character

Male and female gonads morphology observed during the observation period can be seen in Figure 1 below. The morphology, *H. scabra* sea cucumber is the animals with separate sexes (dioecious), ie male and female genitalia are in different individuals.

The observations show that gonadal morphology of the male gonads (Figure 1a) is generally tubular creamy white with a longer compared to the female gonads (Figure 1b) is generally golden yellow with a tubular shape that is more swollen. Characteristics of the tubule length (Figure 2) were observed ranging from 1 cm - 5.8 cm with the number of strands that

observed in the tubular branches ranged from 1303 to 2896 strands.

H. scabra gonad development qualitatively observed during the period of January 29, 2017 to 20 September 2017 are listed in Table 1 and Figure 3. Phase *H. scabra* gonad development observed during

the period January 2017 to September 2017 in every phase of the moon is new moon phase (BB) and full moon (BP) shows that the highest spawning (spawning phase or phase 5) occurred in May that the BP cycle as much as 9 individual and in March, BP phase spawning phase (5) of 7 individuals.

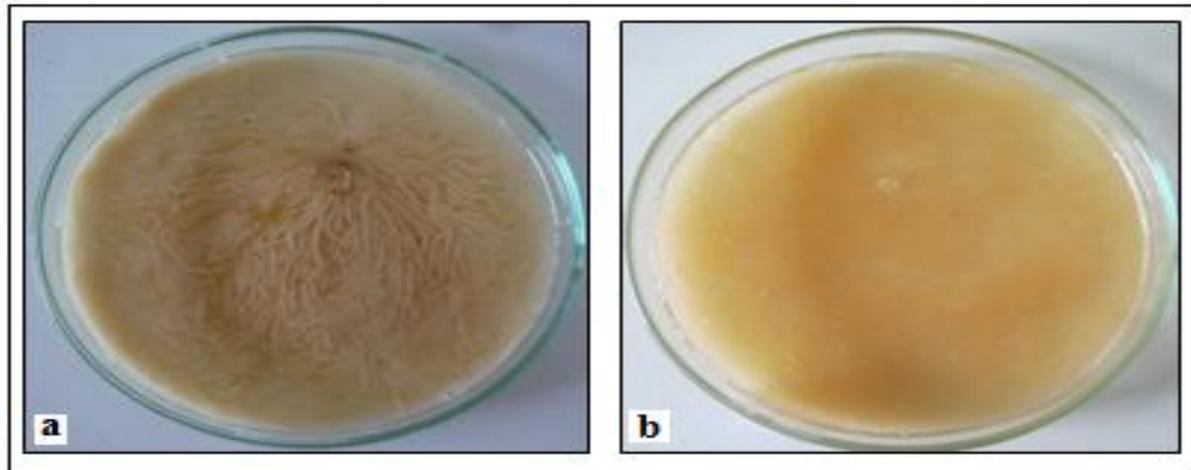


Fig. 1. The morphology of *H. scabra* gonad; a. Male, b. Female.

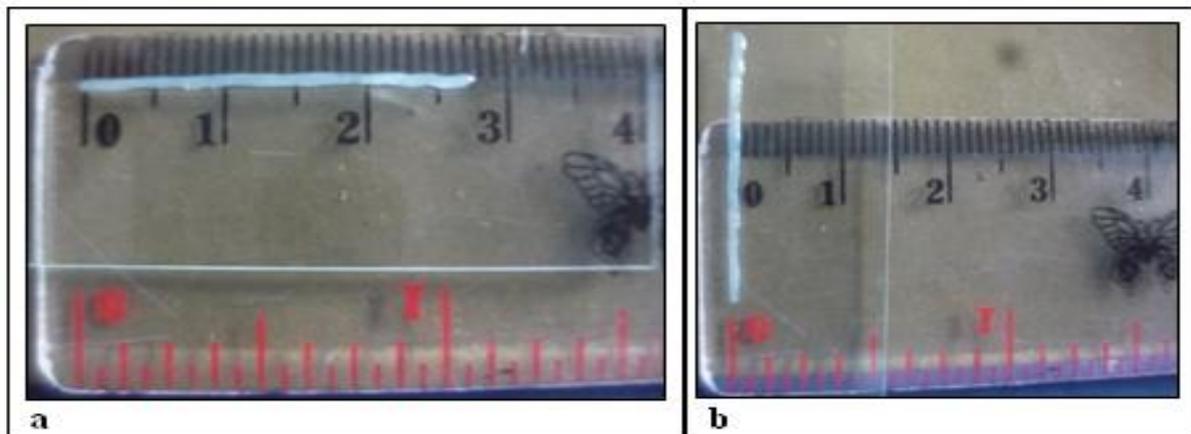


Fig. 2. The size of the tubules; a. Long, b. Wide.

The percentage of gonad development showed that 90% were spawning phase (V) on the phase of BP in May. Other months it is observed that, the stage of gonad development vary where all phases of the development was observed both in the phase of emptying (I), the phase of development (II), the phase of activation of I (IIIa), phase activation II (IIIb), the maturation phase (IV) and phase spawning (V).

If, based on gonad maturation stage *H. scabra* observed then, a good parent for spawning is a phase IV or overcooked. This is in accordance with the

opinion of Tuwo and conand (1992), which suggests that a good parent for the spawning of familia Holothuroidea is 4 or mature phase.

The percentage of the maturity level of male and female gonads *H. scabra* dominated by TKG phase V to the phase of BP in May. TKG male gonads by 60% in the phase V, female gonads 30% and only 10% of the male gonads are in phase I or phase emptying.

It is also observed as much as 60% of the activation phase contained in the male gonads or the stage B in

September. On the other phases of the moon period, it is observed that the TKG males and females varies between each phase of the TKG (Figures 3 and 4).

The similarity between the tubular gonad maturity stage in the gonads showed that *H. scabra* has a synchronous pattern of individual reproduction, the male and female gonads mature together. While

variations between individual gonad maturity stage *H. scabra* at any time watu sampling indicates that the reproductive patterns of *H. scabra* at the population level is asynchronous. With asynchronous reproductive patterns, *H. scabra* can make the process of spawning throughout the year with peak spawning occurs in a given month.

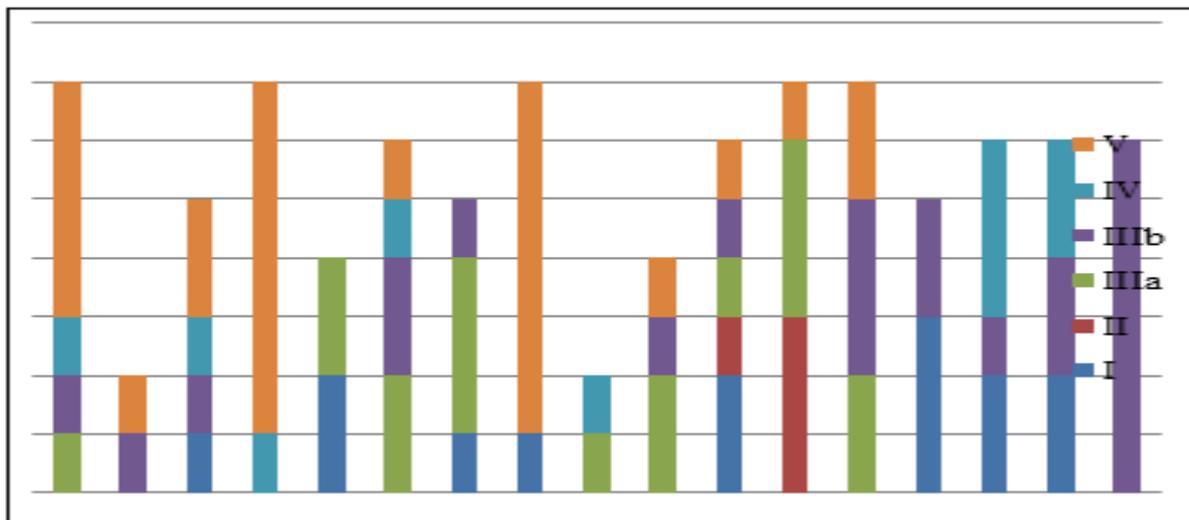


Fig. 3. Percentage of *H. scabra* gonad maturity level Males the period January 2017 - September 2017.

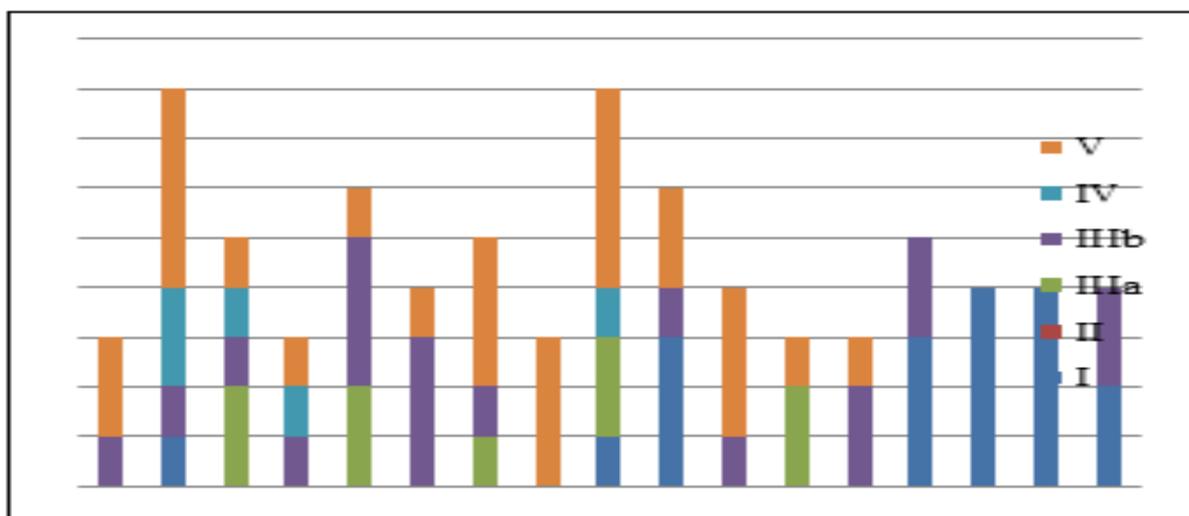


Fig. 4. Percentage of *H. scabra* gonad maturity level Betina the period January 2017 - September 2017.

The results obtained show that the peak spawning occurs in March and May in phase BP.

The highest peak of the cycle IKG observed period January 2017 - September 2017 occurred at the full moon phase (BP) in August and May. It is seen that 60% of the samples were observed to be in phase 1

(discharge) in August and 90% of the samples were observed to be in phase V gonad maturity level in May (Figure 5). The results of measurements of environmental parameters (physical-chemical water) during the observation showed physical-chemical parameters aquatic environment are at the optimum condition for the maintenance of *H. scabra* (Figure 7).

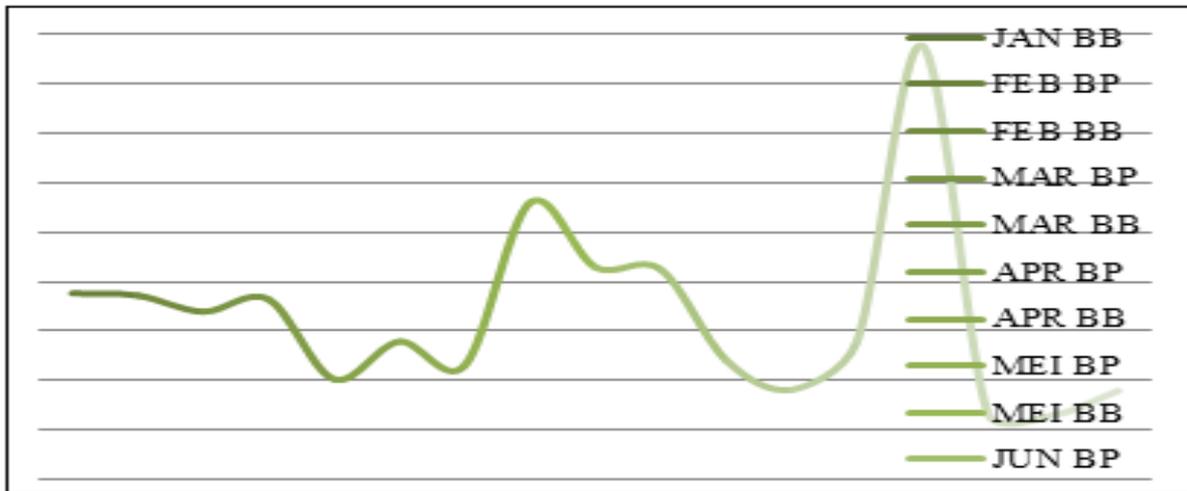


Fig. 5. Cycle IKG H. scabra.

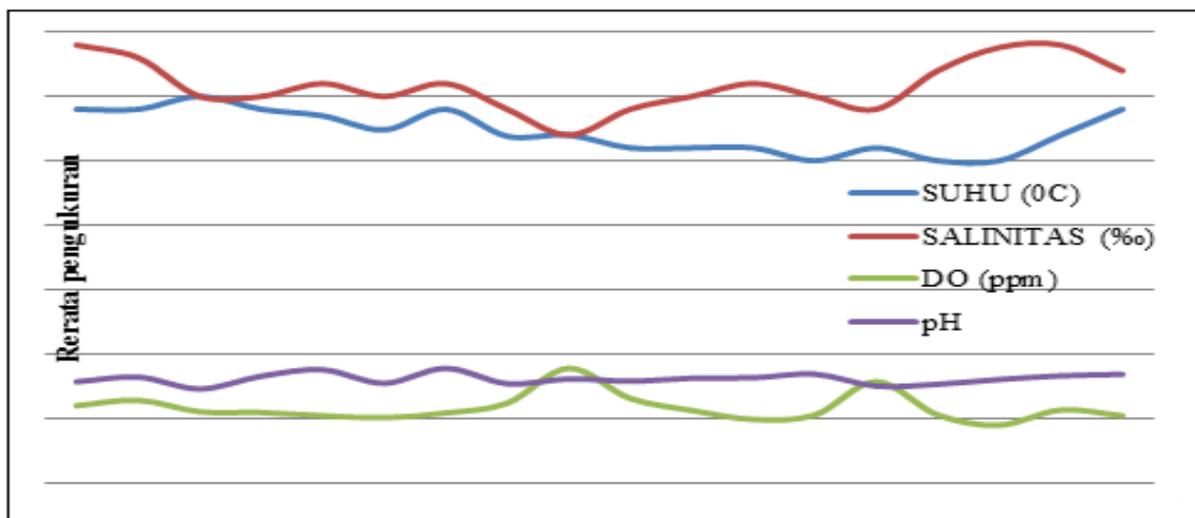


Fig. 6. Average environmental parameters.

Plankton observed during the observation period is *Metapenaeus monoceros*, *Skeletonema coatatum*,

Genus *Rhizosolenia* (*R. bergonii*, *R. stoltefothii*). This plankton species is a natural feed.

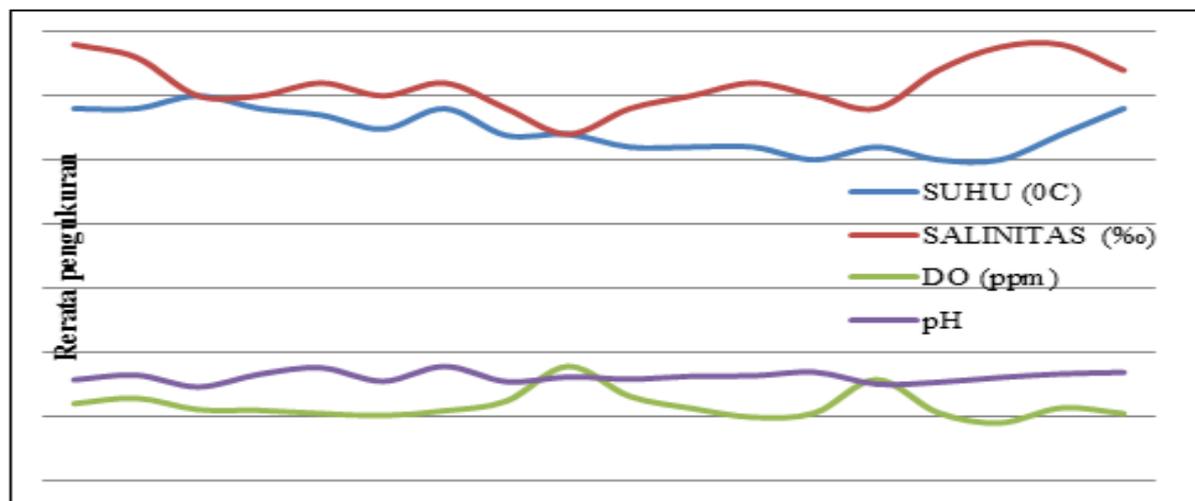


Fig. 7. Average environmental parameters.

Conclusion

H. scabra sea cucumbers have reproductive patterns asynchronously, allowing it to be able to spawn throughout the year, with peak spawning occurs in the month of May or the stage of BP (90%), and in March, BP phase spawning phase (5) of (70%).

Thank-you note

The authors thank the DRPM, the Ministry of Research, Technology and Higher Education for funding this research.

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