

PREVALENCE AND INTENSITY OF *Octolasmis* spp. INFESTATION IN MUD CRABS (*Scylla* spp.) IN WAEL COASTAL WATERS, MALUKU, INDONESIA

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ABSTRACT

Octolasmis is one of the most common barnacle species found on crabs. The prevalence and intensity of *Octolasmis* infestation on crabs can indicate the health of crab populations, both in nature and aquaculture systems. This study aimed to determine the prevalence and intensity of *Octolasmis* spp. infestation on mud crabs *Scylla* spp. in Wael coastal waters, Maluku, Indonesia. Seventeen mud crab samples of seven males and ten females were collected from Wael coastal waters in January-February 2024. Each crab was measured for carapace length and body weight, and the number of infested crabs and *Octolasmis* spp. were counted in each infested crab. Prevalence of *Octolasmis* spp. in mud crabs *Scylla* spp. reached 64.71% with intensity of 28.09 ind/crab. Female crabs had a higher prevalence, 55%, and intensity of $10,59 \pm 1,21$ ind/crab than males, 45% and $7,59 \pm 0,82$ ind/crab, respectively, but statistically not significantly different ($P = 0.311 > 0.05$). Correlation tests showed that body weight and carapace length of mud crabs were negatively correlated with *Octolasmis* spp. infestation, and the relationship was weak, $R = -0.084$ and -0.133 , respectively. These findings provide preliminary information on the level of *Octolasmis* spp. infestation in mud crabs *Scylla* spp. in Wael coastal waters. Comprehensive research is required using proportional sample size, including the effect of season and water quality on *Octolasmis* spp. infestation levels.

Keywords: parasites, density, host size, crabs, barnacle

INTRODUCTION

Octolasmis barnacle is a parasite commonly associated with crabs, both in natural and cultured systems (Putra *et al.*, 2021; Rumondang *et al.*, 2022). *Octolasmis* infestation in mud crabs *Scylla* spp. has been reported in several countries, including Indonesia (Khattab, 2018; Bindu, 2018; Hassan *et al.*, 2019; Helfiani *et al.*, 2023). *Octolasmis cor* and *O. angulate* are the most common species in the mud crabs *Scylla serata* and *S. tranquebarica* (Yusni and Haq, 2020). *Octolasmis* chooses various specific spots on the host, such as on the inner (hypobranchial) or outer (hypobranchial) surface of the gill exoskeleton, on the left or right edge of the carapace and the external part of the mouth (Kumaravel *et al.*, 2009). *Octolasmis* grows and matures rapidly, highly egg production and host numbers increase within 2 weeks (Gaddes and Sumpton, 2004). *Octolasmis* size on the outer gill surface was found to be larger than that on the inner surface of the mud crab *S. seratta* (Voriss *et al.*, 2000). *Octolasmis* infestation in

mud crabs as a parasite or commensal symbiosis is still debated because, as filter feeders, *Octolasmis* only utilises currents from the crab's breathing activity that brings in planktonic-sized food, and during the crab moulting, the *Octolasmis* cyprid will be released (Santos, 2002; Bindu, 2018). However, massive colonisation of *Octolasmis* on the gill surfaces and the consequences of the accumulation of organic debris can block the exchange of oxygen and carbon dioxide gases, causing impaired respiration in the mud crab *Scylla seratta* (Voriss *et al.*, 2000; Chong, 2022).

Octolasmis colonisation alters the histopathology of mud crab *S. serrata* gills, has been reported by Yahya *et al.* (2021). Apart from increased stress on the respiratory organs, high colonisation of *Octolasmis* can disrupt the normal activity and growth and even cause mortality of the hosts *S. serrata*, *Portunus sanguinolentus* and *P. pelagicus* (Li *et al.*, 2015; Bindu, 2018; Hassan *et al.*, 2019). *Octolasmis* infestation potentially threatens populations of *Scylla* spp. in nature and

aquaculture systems (Yusni and Haq, 2020; Purna *et al.* 2021; Suherman *et al.*, 2022).

Wael coastal waters is a production centre of mud crabs, *Scylla serrata*, *S. tranquebarica* and *S. oceanic*, in Maluku (Pary, 2010) and has the potential for crab farming. It is critical to know the level of *Octolasmis* infestation on a local scale for assessing the health status and management of crab populations. However, studies on the prevalence and intensity of *Octolasmis* infestation in mud crabs in this area have yet to be available. This study aims to determine the prevalence and intensity of *Octolasmis* infestation in mud crabs *Scylla* spp. in the Wael coastal water, Maluku, Indonesia.

MATERIAL AND METHODS

Mud crab sampling

Mud crabs *Scylla* spp. were sampled from January to February 2024 from the Wael coastal water, West Seram Regency, Maluku (3°04'04 "N 128°05'17 "E) (**Figure 1**). The crabs were collected using bamboo traps from the mangrove coast with sandy to muddy substrates. All the crabs were kept in a coolbox with ice. They were transported to the Laboratory of Cultivation, Department of Aquaculture, Faculty of Fishery and Marine Science, Pattimura University in Ambon.

Data collection

Each mud crab was cleaned and dried before body weight and carapace length were

measured. Sex differentiation of the crabs according to Yayasan WWF Indonesia (2023). The number of mud crab samples obtained was seventeen (17), consisting of seven (7) males and ten (10) females. To observe parasites in the crabs in this study, the crabs were killed by spiking the thorax, where the centralised nervous system consisting of two anterior ganglia was punctured and destroyed quickly with an awl (Corte *et al.* 2021). *Octolasmis* spp. presence of *Scylla* spp. was observed by removing the carapace and examining the gill parts and margins (**Figure 2**). The prevalence and intensity of *Octolasmis* spp. infestation were calculated according to Yusni and Haq (2020) with the following formula:

$$Prevalence = \frac{\sum \text{Infested host}}{\sum \text{tested hosts}} \dots\dots\dots (1)$$

$$Intensity = \frac{\sum \text{parasites}}{\sum} \text{ Infested host} \dots\dots\dots (2)$$

Data analysis

Prevalence and intensity data were analysed descriptively. A T-test (two samples assuming unequal variances) was used to compare the intensity of *Octolasmis* spp. infestation between male and female mud crabs at $\alpha = 0.05$. A correlation test was used to examine the relationship between body weight and carapace length of mud crabs with the intensity of *Octolasmis* spp. infestation. All analyses using Microsoft Excel.



Figure 1. Sampling site in Wael coastal water, West Seram Regency, Maluku. Photo attributions: Google Airbus Data SIO, NOAA, U.S. Navy, NGA, GEBCO Maxar Technologies TerraMetrics.

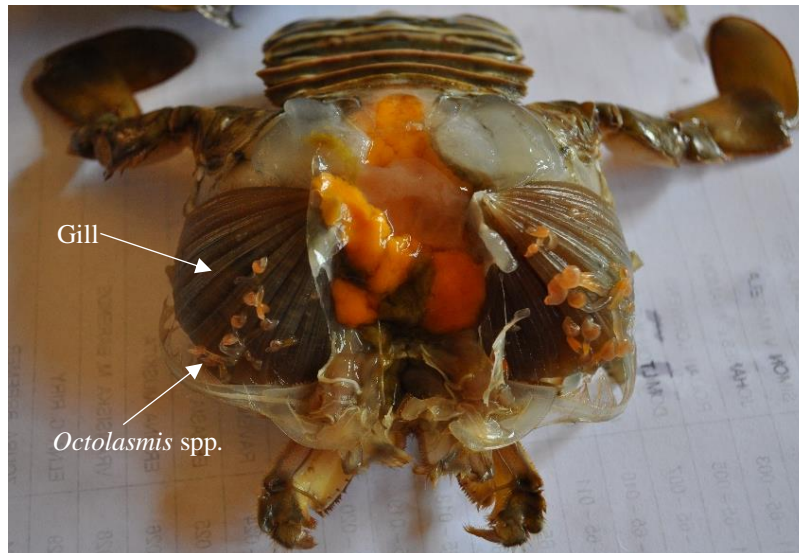


Figure 2. Crabs' gill infested with *Octolasmis* spp.

RESULTS AND DISCUSSION

The prevalence of *Octolasmis* spp. infestation in mud crabs *Scylla* spp. from the Wael waters, Maluku reached 64.71% and intensity of 28.09 ind/crab with the length range of *Octolasmis* spp. detected ranged from 3-9 mm. The prevalence of *Octolasmis* spp. infestation on female mud crabs (55%) was higher than on male mud crabs (45%) (**Figure 3a**). The average \pm SE intensity of *Octolasmis* spp. infestation on female mud crabs was also higher than on male mud crabs, 10.59 ± 1.21 ind/crab and 7.59 ± 0.82 ind/crab, respectively (**Figure 3b**). However, there was no statistically significant difference between *Octolasmis* spp. intensity on female and male crabs, P value = $0.311 > 0.05$ (**Figure 3b**).

The distribution of *Octolasmis* spp. infestation based on body weight (range 130 - 539 g) and carapace length (range 8.8 - 17 cm) of *Scylla* spp. mud crabs in this study showed the same pattern (**Figure 4**). Correlation tests showed that body weight and carapace length of mud crabs were negatively correlated with *Octolasmis* spp. infestation. Still, the relationship was weak, with correlation values (R) of -0.084 and -0.133, respectively (**Figure 4**).

The prevalence and intensity of *Octolasmis* spp. infestation on *Scylla* spp. mud crabs from Wael Waters were reported for the first time. *Octolasmis* spp. infested more than 50% of the mud crabs *Scylla* spp. with an intensity of less than 30 ind./crab. The prevalence and intensity of *Octolasmis* spp. in mud crabs from Wael Waters can be categorised as relatively

moderate compared to several previous studies (**Table 1**). Seasonal changes affect *Octolasmis* spp. density, and the highest populations of *Octolasmis* spp. in mud crabs are found during the rainy season (Gaddes and Sumpton, 2004; Lerssutthichawal & Penprapai, 2013). This contradicts Bindu (2018), who reported that the highest density of *Octolasmis* spp. was found in summer when salinity increased. Another study reported that *Octolasmis* spp. density increases with depth (Gaddes and Sumpton, 2004). This study was conducted in the summer (January-February). It did not measure water quality, so it is impossible to confirm whether the density was higher or lower than the wet season and how it relates to local water quality. The variations in prevalence and intensity between locations are influenced by several factors, including environmental conditions (temperature, salinity and habitat quality), host susceptibility (size/age, sex and moulting phase), and parasite biology (Lerssutthichawal and Penprapai 2013; Bindu, 2018). Therefore, it is important to conduct further research comparing the density of *Octolasmis* spp. in both seasons and its relationship with water quality.

The prevalence of *Octolasmis* spp. infestation in female mud crabs was relatively higher than in male mud crabs in this study, supported by several previous studies (Bindu, 2018; Wardhani et al., 2018; Syahputra 2020; Suherman et al., 2022) (**Table 1**). *Octolasmis* infestation is affected by moulting conditions (Bindu, 2018). Male mud crab moulting time is faster than female mud crab moulting time (Pawhestri, 2015). For these reasons, the shorter moulting time of male crabs than

females may reduce the chance of *Octolasmis* infestation in male mud crabs. In contrast, Santos (2002) reported that *Octolasmis* infestation rates in males and females were similar. The highest *Octolasmis* spp. infestation rate was found in the intermolt phase (91.8%), where 55.9% of females were in the early gonadal development phase and 53.6% of males were in the late development phase (Santos, 2002). Kobayashi and Kato (2003) reported that the survival rate of female ocypodid crabs *Macrophthalmus milloti* infested with *Octolasmis unguisiformis* nov is higher than male crabs. Rasheed and Mustaqim (2017) revealed that the reproduction of Portunid crabs was not significantly affected by *Octolasmis* infestation. The fact that female crabs are more resistant than males could be a potential reason female mud crabs have a higher infestation of *Octolasmis* than male mud crabs.

This study found that *Octolasmis* spp. infestation decreased with the size of mud crabs, but the correlation was weak. This finding contradicts previous studies (Kumaravel *et al.*, 2009; Bindu, 2018). These studies reported that *Octolasmis* infestation is positively correlated with mud crab size. Santos (2002) reported that the *Octolasmis* infestation rate of adult crabs (11%) was higher than that of juveniles (1.1%). Infestation of *Octolasmis* larvae cypris in crab hosts increases after moulting and at the time of approaching sexual maturity (Bindu, 2018). Tiurlan *et al.* (2019) reported that mud crabs *Scylla* sp. are sexually mature if they have a carapace width of more than 10 cm. The carapace length of mud crab samples ranged between 8.8 and 17 cm in this study. Therefore, the contradictory results of this study compared to the previous studies may be due to the small sample size and short ranges of carapace length used in this study. Therefore, it is recommended that the sample size be increased in future studies.

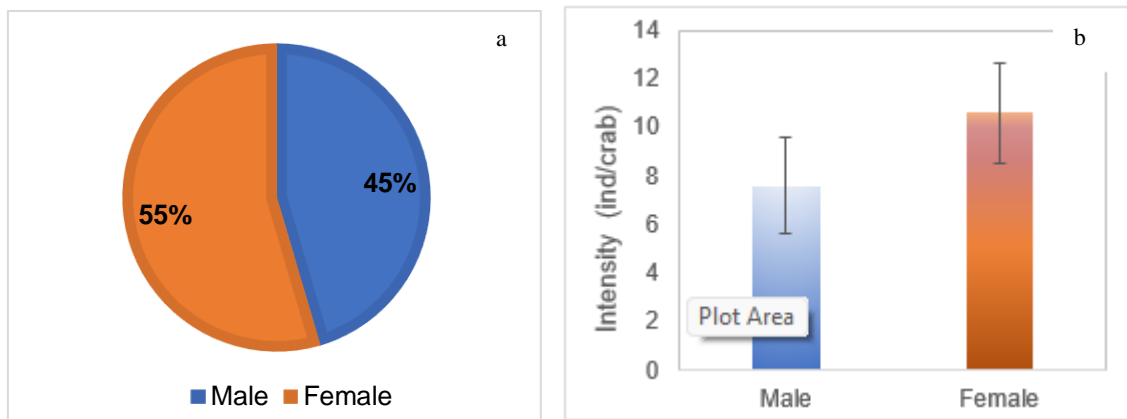


Figure 3. Prevalence (a) and intensity (b) of *Octolasmis* infestation on *Scylla* spp. mud crabs from the Wael Waters, West Seram, Maluku, in January - February 2024.

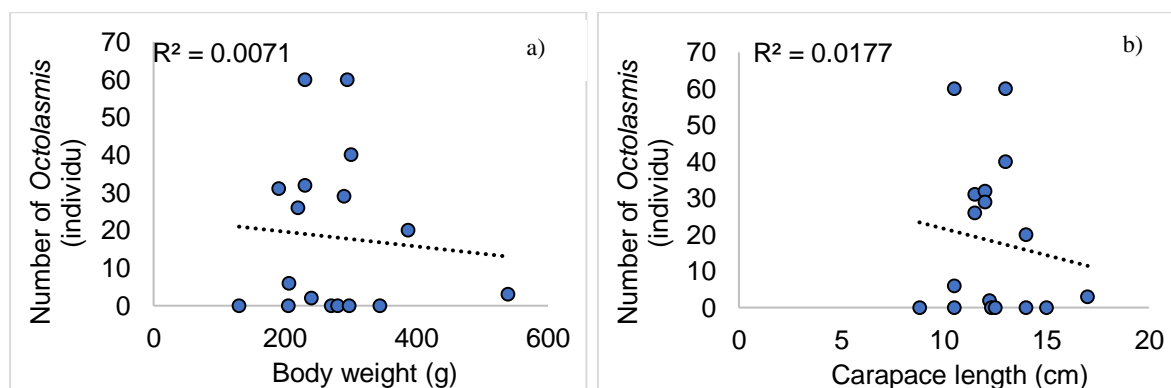


Figure 4. Distribution of *Octolasmis* infestation based on body weight (a) and length (b) of *Scylla* spp. mud crabs from Wael Waters, West Seram, Maluku, in January – February 2024.

Table 1. Studies on the prevalence and intensity of *Octolasmis* infestation in crabs

No.	Species	Location	Prevalence (%)	Intensity (ind/crab)	References
1	<i>Scylla serrata</i>	Kubu Raya Regency	12,50%	28	Helfiani et al. (2023)
2	<i>Scylla serrata</i>	Pohuwato, Sulawesi Utara	100	males 60,2 females 137,7	Pakaya et al. (2022)
3	<i>Scylla serrata</i>	Cadek, Aceh Besar	90	69	Danesti et al. (2022)
4	<i>Scylla serrata</i>	Gampong Blang Banda Aceh	75	3,67	Muliyana et al. (2022)
5	<i>Scylla serrata</i>	Puhowato Tomini Bay	males 46 females 100	males 12 females 56	Suherman et al. (2022)
6	<i>Scylla</i> sp.	Kota Banda Aceh (Culture)	-	11,3	Putra et al. (2021)
7	<i>Scylla serrata</i>	Wonorejo Surabaya	70	-	Purna et al. (2021)
8	<i>Scylla</i> spp.	Bombana, Sulawesi Tenggara	males 90,31 females 97,26	males 69,82 females 141,85	Nur et al. (2021)
9	<i>Scylla serrata</i>	Gresik, Jawa Timur	85	-	Yahya et al. (2021)
10	<i>Scylla serrata</i>	Sidoarjo, Jawa Timur	males 90 females 150,7	males 95 females 167,1	Syahputra (2020)
11	<i>Portunus pelagicus</i>	Terengganu Malaysia	84.62	-	Hassan et al. (2019)
12	<i>Scylla serrata</i>	Kerala, India	84,47	23,79	Bindu (2018)
13	<i>Portunus pelagicus</i>	Red Sea	92	0-127	Khattab (2018)
14	<i>Scylla serrata</i>	Semarang (crab farms in ponds)	males 31.9 females 68.09	-	Wardhani et al., 2018
15	<i>Portunus pelagicus</i>	Karachi, Pakistan	2,9	-	Rasheed and Mustaquim (2017)
16	<i>Scylla</i>	Terengganu Malaysia	71	14,4	Ihwan et al. (2015.)
17	<i>Scylla olivaceai</i>	Kantung, Thailand	97	-	Lerssutthichawal and Penprapai (2013)
18	Edible crab	Parangipettai, India	26,46	10,32	Kumaravel et al. (2009)
19	<i>Portunus pelagicus</i>	Moreton Bay Australia	92	-	Gaddes and Sumpton (2004)
20	<i>Scylla</i> spp.	Wael Waters, West Seram, Maluku, Indonesia	64,71	28,08	This study

CONCLUSION AND SUGGESTIONS

Prevalence of *Octolasmis* spp. infestation in mud crabs *Scylla* spp. from Wael coastal waters reached more than 50% with an intensity of approximately 28 ind./crab. This finding provides preliminary information on the level of *Octolasmis* spp. infestation in mud crabs *Scylla* spp. in this area. Considering the potential impacts of *Octolasmis* spp. infestation contributing to parasite transmission in marine

ecosystems and could threaten the sustainable mud crab production in Wael coastal waters, West Seram, and Maluku; further comprehensive research needs to be carried out using a larger and proportional sample size and should include the effect of seasons and water quality of Wael coastal waters on *Octolasmis* spp. infestation levels on mud crabs.

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