International Journal of ChemTech Research
CODEN (USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555
Vol.10 No.6, pp 158-164, 2017

Effect of Ecdyson Hormone on Mortality and *Moult* Death *Syndrome* of Larvae Mud Crab Scylla olivacea

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Abstract : The main problem with hatchery crabs *Scylla olivacea* is the high mortality of larvae. The addition of ecdyson hormone is capable of suppressing mortality and failing molting syndrome. The study was conducted at Maranak Crabbing Station Unit BBBAP Maros South Sulawesi Province. The test animals are larvae *Scylla*spp stadia zoea. The test feed in this study was rotifera and artemia which was enriched with ecdyson hormone. The research contained in the form of 110 L Aquarium is 12 units filled with water 100 L with the density of larvae 50 tail / L. The treatments were various doses of the ecdyson hormone in the diet, ie A = 0 ppm, B = 0.5 ppm C = 1 ppm and D = 1.5 ppm, with 3 replications each. The parameter parameters measured by mortality rate and syndrome failed to molting. The results showed that the treatment of various doses of ecdyson hormone had a good effect in suppressing mortality and syndrome failure of larval larvae of Mud crabs.
Keywords : ecdyson, mortality, molt death syndrome, mud crab, zoea.

Introduction

Mud crab cultivation still faces a major problem at a fairly high mortality rate. The phase of the zoea stadium is a phase that has a fairly high mortality rate. Suggests high mortality in this phase due to lack of supply of nutrients both internal and external bodies. The early stage of the larvae requires enormous energy both for metabolism, growth and for metamorphosis activities[28]. Factors affecting high mortality include organ and nerve development[35], hormones[7], energy[19], cannibalism[27] as well as external factors such as stressors Environment[10], fotoperiod[17], salinity and temperature[11], nutrition[4] and pathogen[21].

One solution to reduce mortality of larvae of mud crabs especially in zoea stadia with proper nutrition. This strategy reduces the impact on the endogeneous process of being exogeneous. Larvae of the mud crab in the zoea phase, experiencing unstable conditions, the larvae are still in the process of organogenesis, and the eye organ is not fully formed. This is due to the low quality of the feed given either a nutritional composition tie, dose or feeding time. Therefore it is necessary supplementation of quality nutrition to help metabolism, growth and metamorphosis[17]. In addition, in the early stadia, the need for hormone molting is needed because the hormone ecdysoncan not be synthesized by crab larvae, so the need is needed from outside the body either through feed and synthesized from cholesterol as precursornya.

Several studies have shown that the ecdyson hormone is capable of increasing molting periods such as Penaeusmonodon tar prawns[15,24].Suggests that the hormone ecdyson has a major role in the process of metamorphosis and development of mud crab larvae[8]. The presence of ecdyson hormone will increase the rate

of metamorphosis through the regulation of the process of skin change. Stated that the hormone ecdyson has a function as anabolic, hepatoprotective, immunoprotective hormones, antioxidants and hypoglemic agents[24].Ecdyson hormone acts as a hormone molting and regulates physiological functions such as growth, metamorphosis and reproduction[9].

Molting failure is influenced by insufficient availability of ecdyson hormones in the body of mud crab larvae[17]. Suggests that the hormone ecdyson acts as a hormone molting and regulates physiological functions such as growth, metamorphosis and reproduction[10]. The hormone ecdyson has a major role in the process of metamorphosis and development of mud crab larvae[5]. States that ecdyson hormone concentration levels vary across species, stadia development, metamorphosis and seasons[3].

Improved feed management through the enrichment of natural feed using ecdyson hormone is expected to stimulate molting and reduce the percentage of mortality and development of metamorphosis through physiological improvement of the body. Other lobsters do molting but suffer disability and die. The molting syndrome experienced by crustaceans in the early stages of the larval stadium is generally caused by insufficient ecdysteroid supply to molting[34]. Ecdyson hormone supplementation in the diet is expected to cope with deaths from the molting syndrome. In this connection, research on the effect of ecdyson hormone supplementation with different doses administered through rotifers and artemia to mortality and syndrome failed to mole larvae of mud crab in zoea stadia should be done

Materials and Methods

The test animal that will be used in this research is larvae of mud crab *S. olivacea* stadia zoea. The density of the larvae used was 50 ind./ L. The test material to be used is a 20-hydroxyecdysone (20-HE) hormone. Application of the test material through bioencapsulation in rotifer and artemia. The feed to be fed to mud crab larvae during the study was a natural feed of rotifer and artemia and microcapsulateFrippak made Frippak CAR (diameter 5-30 μm) and Frippak CD (diameter 30-90 μm).

The research container will be used in the form of plastic bucket with 110 L capacity of 12 pieces filled with 100 L water. Water media used is sea water of 28-30 ppt with green water system. The replacement of water with the same salinity is done daily as much as 20-25% of the total container volume. The oxygen solubility of the research media can be maintained by completing the aeration in each research medium.

This study used a Completely Randomized Design with 4 treatment doses EcdysonEczysonieA treatment (0 mL/L), B (0.5 mL/L), C (1 mL/L) and D (1.5 mL/L) with 3 replications at each treatment. The test parameters are the mortality rate and the rate of failed molting syndrome calculated daily. The research data obtained were analyzed by using variance (ANOVA). If the results are significantly different, then proceed with W-Tukey Test[32].

Results and Discussion

Mortality

Mortality is an indication of the picture of organisms as a result of mutually supportive interactions between the environment and feed. Production. Mortality of larvae of high mud crabs occurs in the early stages of zoea to megalopa caused by molting failure that occurs due to lack of ecdysteroid supply in the body of mud crab larvae. The results showed that the mortality rate in the treatment of hormone ecdyson has a lower value than treatment without the hormone ecdyson. The mortality rate of mud crab larvae showed an increase as the dose of ecdyson hormone increased. The mortality rate of mud crab larvae can be seen in Figure 1.

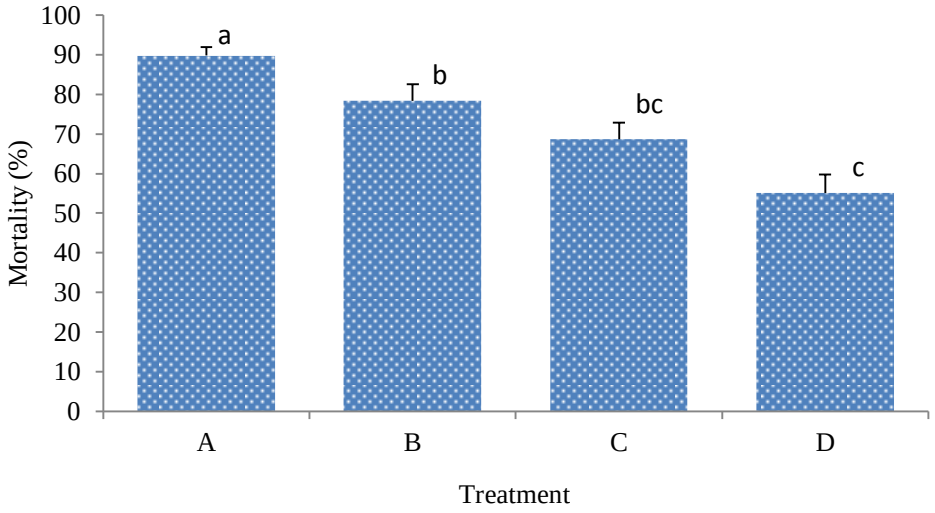

Fig. 1. Average Mortality Rate of Mud Crab during the Study

Figure 1.shows that treatment D has the lowest mortality value of 55.17 ± 4.17%, then treatment C of 68.73 ± 4.21% and treatment B of 78.40 ± 3.25%. Treatment A has a mortality value of 89.83 ± 2.09%. The result of variance analysis showed that there was an effect of ecdyson hormone ($p < 0.05$) on mortality of mud crab larvae. Further tests of Tukey showed that treatment A was different ($p < 0.05$) with other treatments, whereas treatment B was not different ($p > 0.05$) with treatment of C but different ($p < 0.05$) with D not different ($p > 0.05$).

The results showed that treatment of hormone ecdyson had a good effect on decreasing mortality of mud crab larvae. Feed that has a good intake of nutrients which through the addition of ecdyson hormone is a source of energy sources, steroids and sterols that play a role in the process of metamorphosis and growth. The higher the content of the ecdyson hormone in the feed consumed by larvae then the energy availability in the larvae body is also high that supports various physiological processes and growth metabolism. States ecdyson is a major steroid hormone in arthropods that regulates physiological functions, such as growth, metamorphosis, and reproduction[9]. There are several factors causing high mortality of larvae of mud crabs in the larval phase, such as the molting syndrome[14], bacteria[13], and cannibalism[26].

The presence of the ecdyson hormone in the diet shows that the ecdyson hormone is capable of suppressing mortality of larvae of mud crabs. In arthropods and crustaceans, the hormone molting is the ecdysteroid[15]. The ecdysteroid controls molting and metamorphosis. Molting is the process of changing the size of the carapace caused by the development and metamorphosis of larvae from zoea to crab. Increased ecdysteroid in the blood circulation stimulates the molting, and the decrease of the ecdysteroid can stimulate the hormone that can inhibit the occurrence of molting[23]. The low mortality of mud crab larvae in D treatment (1.5 ppm) compared to other treatments was due to the dose of ecdyson hormone used to optimally control the molting process of mud crab larvae. States that the main role of the ecdysteroid in crabs is to control crustacean shifts[27]. High concentrations of hormones in the blood circulation signify cells to provide barriers to stay in a homeostatic state (balanced), and low doses of hormones are inadequate to stimulate action. Ekdison hormone is a steroid hormone that stimulates the growth and differentiation of insects and crusts through the process of induction of RNA to develop rapidly[35].

Syndrome Fails Molting

Ecdyson hormone acts as a hormone molting and regulates physiological functions such as growth, metamorphosis and reproduction[10]. levels of ecdyson hormone concentrations vary across species, stadia development, metamorphosis and seasons[3]. Stated that the hormone ecdyson has a function as anabolic, hepatoprotective, immunoprotective hormones, antioxidants and hypoglemic agents[24]. The results showed that the ecdyson hormone was able to stimulate the molting period in various species of crustacea[30]. Factors of molting failure and morphological abnormalities are generally due to a lack of nutrient intake and minimal molting hormone in the body of mud crab larvae. Mortality due to molting failure is characterized by

imperfections regardless of the body of the mud crab larvae. Old shell is still attached to the body of mud crab larvae that still attached to the abdomen. Classified the molting model in Scylla serrata into 4 types[14], namely type A: abnormal overall (seriously abnormality) in which the larvae did not release the exuvia as a whole and the larvae died during molting, type B: half abnormal (partial abnormality), where the larvae released Exuvia but unable to release the integument on cheliped or foot of the path or both, type C: slightly abnormal, where larvae release exuvia except integument and cheliped, type D: normal, where larvae release exuvia completely. The results showed that molting period of mud crab larvae decreased during molting period (day) along with increased dose of ecdyson hormone. The molting period value of mud crab larvae can be seen in Figure 2.

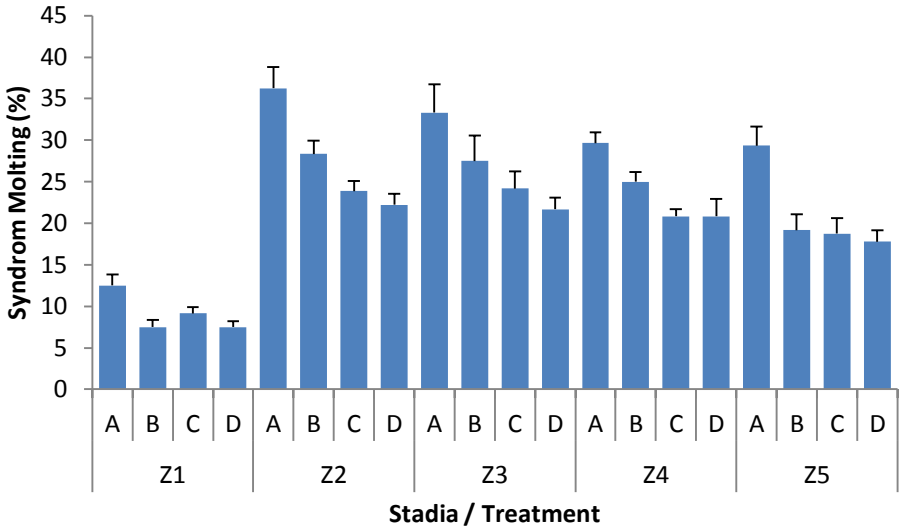

Fig 2. Average Scale of Molting Syndrome of Mud Crab Larva at each Stadia during the Study

Figure 2.above shows the percentage value of syndrome failure molting of different mud crab larvae at each stadia, where in zoea-2 and zoea-3 stages have the highest molting syndrome value. In the zoea-1 stages, syndrome failed molting at treatment A of 12.5 ± 1.3%, B treatment of 7.5 ± 0.9%, C treatment of 9.17 ± 0.7% and treatment D of 7.5 ± 0.7%. In the Zoea-2 treatment stage A was 36.3 ± 2.6%, the B treatment of 28.3 ± 1.6%, the C treatment of 23.9 ± 1.2% and the D treatment of 22.2 ± 1, 3%. In the zoea-3 stadium, the syndrome failed molting value at treatment A of 33.3 ± 3.4%, B treatment of 27.5 ± 3.1%, C treatment of 24.3 ± 2.1% and D treatment of 21.7 ± 1.4%. While the zoea-4 stadia have a molting syndrome value including A treatment of 29.7 ± 1.3%, B treatment of 25.00 ± 1.7%, C treatment of 20.8 ± 0.9% and D treatment of 20.8 ± 2.1%. The value of syndrome failed molting on zoea-5 stadium has the same barrier value on the treatment of hormone namely treatment A of 29.3 ± 2.3%, B treatment of 19.2 ± 1.9%, treatment C of 18.8 ± 1.9% and D treatment of 17.8 ± 1.4%. The results of the variance analysis showed that the hormone ecdyson gave a real effect ($p < 0.05$) to the failed molting syndrome in each stadia of mud crab larvae. A further test showed that treatment A was significantly different ($p < 0.05$) with other treatments.

The results showed the treatment of ecdyson hormone at a dose of 1 ppm was able to reduce the malfunction larva melting syndrome. Ecdyson hormone is able to synthesize and utilized mud crab larvae to stimulate molting well. The availability of sufficient ecdyson hormones can increase metabolism and more effective metamorphosis processes. States that the molting failure experienced by crustaceans in the early stages of the larval stadium is generally due to inadequate supply of ecdyson hormones to molting[34].Suggest that molting is a critical stage in the life of crab larvae[2]. Death often occurs in this period. Death occurs from molting, pathogen, and cannibalism. Explained that deaths occurring in many larvae are due to moult-death syndrome during the transformation process during zoea to megalopa[14]. In the crustacean body, the concentration of the hormone molting is sometimes inadequate resulting in death from molting failure[21].

The high syndrome of molting along with increasing stadia shows that along with increasing stadia and larvae age of mud crabs then the need for ecdyson hormone is also increasing. States that the higher the development rate of crustacean larvae, the higher the ecdysteroid hormone is needed[33].States that the need for

dose of ecdysteroid hormones varies based on the stage of larval development[1]. Furthermore, the concentration of homonecdyson required by the larvae to support the occurrence of molting has increased with increasing larval life. This shows the hormone ecdyson has an impact on the decrease of malfunction larva melting larvae, and with the addition of ecdyson hormone able to induce and accelerate the process of molting in larvae of maize. The ecdyson hormone is able to increase the molting process in crustaceans where the stimulation of the hormone m olting in the premoltphase so as to affect the rapid molting period and the occurrence of molting period synchronization[31]. Thus the ecdyson hormone provides a good impact to suppress the incidence of malabsorption failure of mud crab larvae.

Conclusion

The results of the study and discussion can be concluded that the ecdyson hormone has a good effect on the decrease of mortality rate and syndrome failure molting of mud crab larvae. The mortality rate of larvae of mud crabs reached 55.17 ± 4.17% with a malfunctioning syndrome level ranging from 7.5 ± 0.9% to 28.3 ± 1.6%. It is recommended that hatchery management should be optimized by administering the ecdyson hormone to the feed given to crab larvae during maintenance at a dose of enrichment of 0.5 to 1 ppm, since before and after the dose range does not have an effect on the improvement of survival, development and metamorphosis of mud crab larvae.

Acknowledgments

Acknowledgments to the Directorate of Higher Education of the Ministry of Research and Universities for the scholarship and research grant and the Center for Brackishwater Aquaculture Research and Development Maros for the facilities provided during the study.

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