

**A STUDY OF SPECIES DIVERSITY AND DISTRIBUTION OF  
SEA URCHIN AT BIDONG ISLAND**

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AT BIDONG ISLAND**

**By**

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FAKULTI PENGAJIAN MARITIM DAN SAINS MARIN  
UNIVERSITI MALAYSIA TERENGGANU**

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## LIST OF ABBREVIATIONS

g	-	gram
m	-	meter
%	-	percentage
ACB	-	<i>Acropora</i> branching
ACD	-	<i>Acropora</i> digitate
ACE	-	<i>Acropora</i> encrusting
ACT	-	<i>Acropora</i> tabulate
CF	-	Coral foliose
CM	-	Mushroom coral
CS	-	Coral submassive
DC	-	Dead coral
DCA	-	Dead coral with algae
OT	-	Others
RCK	-	Rock
S	-	Sand

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## ABSTRACT

Four species of sea urchins were identified during sampling sessions. They were *Diadema setosum*, *Diadema savignyi*, *Echinothrix calamaris*, and *Echinometra mathaei*. The highest mean abundance of sea urchin species was *Echinothrix calamaris* ( $5.56 \pm 4.57$  ind.  $500\text{m}^{-2}$ ), followed by *Diadema setosum* ( $2.53 \pm 1.98$  ind.  $500\text{m}^{-2}$ ), *Echinometra mathaei* ( $0.49 \pm 0.47$  ind.  $500\text{m}^{-2}$ ), and *Diadema savignyi* ( $0.46 \pm 0.45$  ind.  $500\text{m}^{-2}$ ) respectively. ANOVA test showed that the distribution of sea urchin was affected by time and depth ( $P < 0.001$ ). Highest mean abundance of sea urchin individuals were observed at slope ( $3.72 \pm 3.97$  ind.  $500\text{m}^{-2}$ ), followed by middle ( $2.80 \pm 3.14$  ind.  $500\text{m}^{-2}$ ), and intertidal ( $0.28 \pm 0.3$  ind.  $500\text{m}^{-2}$ ) respectively. Based on Post Hoc analysis, there were significant difference ( $P < 0.001$ ) between three different level of depths towards the abundance of sea urchin. However, the abundance of sea urchin species was significant ( $P < 0.001$ ) for 9 p.m only, compared to the other periods. The most abundant species of sea urchin observed at Bidong Island was *E. calamaris* with 62% from total individuals of sea urchins observed during the sampling period. There were significant differences ( $P < 0.001$ ) between the effects of the time and depth on the distribution of the *E. calamaris*. Based on Post Hoc analysis, significant differences ( $P < 0.01$ ) were observed at three different level of depths towards the abundance of sea urchin. The abundance of *E. calamaris* also showed significant difference ( $P < 0.001$ ) between 9 p.m compared to the other hours. The distribution of *D. setosum*, *D. savignyi* and *E. mathaei* were only affected by depth ( $P < 0.05$ ) and not affected by the different ranges of time ( $P > 0.05$ ).

Based on Post Hoc analysis, *D. setosum* showed significant difference ( $P < 0.01$ ) between three different level of depths while the abundance of *D. savignyi* was significant ( $P < 0.05$ ) between intertidal and slope. The distribution of *E. mathaei* showed the significant difference between intertidal and middle ( $P < 0.01$ ).

# KAJIAN MENGENAI KEPELBAGAIAN SPESIS DAN TABURAN LANDAK LAUT DI PULAU BIDONG

## ABSTRAK

Empat spesis landak laut dikenalpasti sepanjang tempoh persampelan. Mereka terdiri daripada *Diadema setosum*, *Diadema savignyi*, *Echinothrix calamaris*, dan *Echinometra mathaei*. Purata kelimpahan tertinggi spesis landak laut adalah *Echinothrix calamaris* ( $5.56 \pm 4.57$  ind.  $500\text{m}^{-2}$ ), diikuti dengan *Diadema setosum* ( $2.53 \pm 1.98$  ind.  $500\text{m}^{-2}$ ), *Echinometra mathaei* ( $0.49 \pm 0.47$  ind.  $500\text{m}^{-2}$ ), dan *Diadema savignyi* ( $0.46 \pm 0.45$  ind.  $500\text{m}^{-2}$ ) secara berturutan. Ujian univariat ANOVA menunjukkan bahawa taburan landak laut adalah dipengaruhi oleh masa dan kedalaman. Purata kelimpahan bagi setiap individu landak laut adalah di zon cerun karang ( $3.72 \pm 3.97$  ind.  $500\text{m}^{-2}$ ), diikuti dengan zon pamah karang ( $2.80 \pm 3.14$  ind.  $500\text{m}^{-2}$ ), dan zon intertidal ( $0.28 \pm 0.3$  ind.  $500\text{m}^{-2}$ ) secara berturutan. Merujuk kepada ujian Post Hoc, terdapat perbezaan signifikan ( $P < 0.001$ ) di antara ketiga-tiga kedalaman yang berlainan terhadap kelimpahan taburan landak laut. walaubagaimanapun, kelimpahan landak laut adalah signifikan ( $P < 0.001$ ) pada 2000-2200 sahaja, berbanding dengan jarak masa yang lain. Spesis landak laut yang paling banyak diperhatikan di Pulau Bidong ialah *E. calamaris* dengan 62% daripada jumlah keseluruhan. Terdapat perbezaan signifikan ( $P < 0.001$ ) di antara kesan masa dan kedalaman terhadap taburan *E. calamaris*. Merujuk kepada ujian Post Hoc, perbezaan signifikan ( $P < 0.01$ ) diperhatikan pada ketiga-tiga kedalaman yang berlainan terhadap kelimpahan landak laut. Kelimpahan *E. calamaris* juga menunjukkan perbezaan signifikan ( $P < 0.001$ ) pada 2000-2200 berbanding dengan jarak masa yang lain. Taburan *D. setosum*, *D. savignyi* and *E. mathaei* hanya dipengaruhi oleh faktor

kedalaman ( $P < 0.05$ ) dan tidak dipengaruhi oleh factor masa ( $P > 0.05$ ). merujuk kepada ujian Post Hoc, *D. setosum* menunjukkan perbezaan signifikan ( $P < 0.01$ ) di antara ketiga-tiga kedalaman yang berlainan manakala kelimpahan *D. savignyi* signifikan ( $P < 0.05$ ) di antara zon intertidal dan zon cerun karang. Taburan *E. mathaei* menunjukkan perbezaan signifikan di antara zon intertidal dan zon pamah karang ( $P < 0.01$ ).