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Effect of different depths and soaking periods on crab catch in folding dome-shaped traps, in Rembang Sea, Indonesia

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ABSTRACT

The objective of this study was to compare the catches of crabs caught in folding dome-shaped trap from two different depths (17 and 40 m) and three soaking periods (12, 15 and 18 h). The fishing operation for the traps followed the standard method of fishers except for the different soaking periods. Data were analysed using paired sample t-test. The analysis showed that there were significant ($p < 0.001$) differences in the total catch of crabs between depths and soaking periods. The total catch of crabs from 40 m depth was higher than that from 17 m.

Keywords: Crab, Depth, Folding dome-shaped trap, Soaking period

Rembang District is located on the northern coast of Central Java, Indonesia, with a 63 km coastline and an area of approximately 1,014 km². Thirty five percent of the area of Apex District is a coastal region covering an area of 355.95 km². Rembang fisheries productivity has decreased by about 33.18% during 2013 to 2017. Rembang has 14 districts, six of which are in the coastal area (Boesono *et al.*, 2016; Boesono *et al.*, 2018). Rembang is at a strategic location of Rembang District as it is close to potential marine waters. However, public welfare in Rembang is still poor which means that some potential resources need to be developed to increase the economy of the region (Ameriyani, 2014).

Mostly Rembang fishers use the folding box-shaped trap to catch crabs with a boat size less than 5 GT in coastal waters. The small-scale fishing traps target crabs, shrimp, snails and demersal fishes in shallow waters (Martasuganda, 2008), while the medium and large-scale fishing traps operate offshore and target demersal fishes, crabs and shrimps at depths of 20 to 70 m (Grasso and Basil, 2002). According to Martasuganda (2008), folding traps vary in shapes and can be rectangular, trapezoidal, cylindrical, oval or semi-circular. Important considerations while designing traps is the ease to carry them in large numbers, ease to operate and to set on the deck, light weight, ease to sink and to lift during hauling operations (Puspito, 2011). The most stable shape is the folding dome-shaped trap, as they are resilient and can be used longer and synthetic mesh materials are necessary to make them (Mahulette, 2005; Septiyaningsih and Adi, 2013).

The present study aimed to determine the difference in the number of crabs caught in the folding dome-shaped

traps, at different depths and duration of soaking. The study also determined whether there are differences in the size of the crabs caught from different depths.

During the study, folding dome-shaped traps were operated at two different depths of 17 and 40 m, with varying times of soaking *viz.*, 12, 15 and 18 h at each depth. Fifty units were used for each depth and time of soaking. As there were three different soaking periods in each depth, the total number of folding dome-shaped traps used was 300 units. The traps were operated using a series of rigging systems as in basic long liners. After operating in 40 m depth, the same was repeated at 17 m depth, interval between the operations being 1 day between depths.

One unit of folding dome-shaped trap (Fig. 1) comprises buoys, buoy line, mainline, branch line and trap line in addition to the trap. A series of 50 folding dome-shaped traps were connected and the branch line length was 3 m with 10 m distance between the branch line. The fishing operation (setting, soaking and hauling) followed was the standard mode as practised by the fishers, but with different soaking times. Each soaking operation of the traps was repeated six times. Data were analysed by paired samples t-test employing two-way ANOVA and Duncan's multiple range test. All statistical analysis were carried out using SPSS for Windows ver. 22.0.

The results showed that the number of crabs caught in each operation at 40 m depth was higher than that from 17 m. Total crabs caught from 40 m were 175 (68.63%), and from 17 m only 80 crabs (31.37%) were caught. Total weight of crabs caught from 40 m (31,500 g) was higher than that from 17 m (9,326 g). The total catch in terms of weight did not vary significantly ($p > 0.05$) between

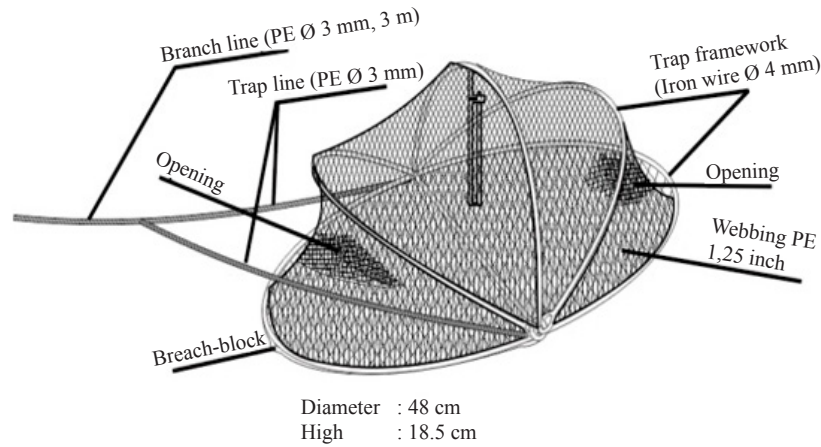


Fig. 1. Folding dome-shaped trap

different depths. Total number of crabs caught at 18 h soaking time was higher than those from 12 and 15 h soaking periods (Table 1). At 18 h soaking period, 106 crabs were caught and at 12 and 15 h, the number of crabs caught were 81 and 68 respectively. The weight of crabs caught at 18 h of soaking was higher than 12 and 15 h soaking period (Table 1), which means that there were no difference between total catch of crabs both in terms of number and weight.

Total catch of crabs at 40 m depth was higher than at depth of 17 m (Fig. 2). At 40 m, the highest catch was obtained at soaking period of 18 h, while from the depth of 17 m, the highest catch was at soaking period of 12 h. This indicates that there were differences in the number of crabs caught at the two depths based on soaking periods. Similarly, the total catch of crabs in terms of weight from the two depths was higher during 18 h of soaking time (Fig. 3), which indicated differences in the weight of crabs based on depth and soaking periods.

There were differences in the total catch of crabs both in terms of weight and number between depths and

soaking periods which was higher at 40 m compared to 17 m. The results indicated that based on differences in depth, the total catch of crabs in terms of number and weight

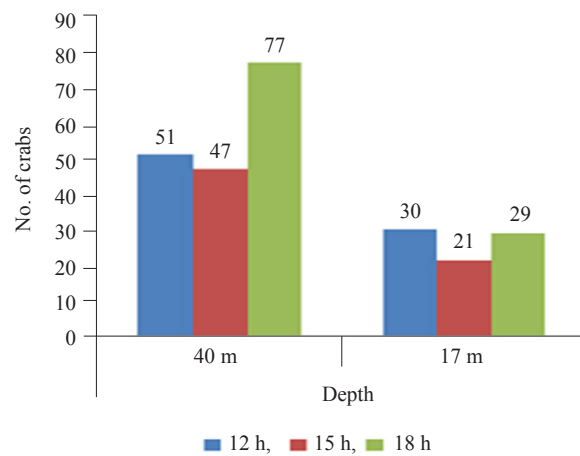


Fig. 2. Total catch of crabs (Nos.) at different depths and soaking periods

Table 1. Catch of crabs in terms of number and weight at different soaking periods

Replications	Total catch of crabs at different soaking periods					
	12 h		15 h		18 h	
	No.	Weight (g)	No.	Weight (g)	No.	Weight (g)
1	10	1,853	5	993	18	2,473
2	10	1,400	10	1,163	23	3,708
3	12	1,963	19	2,876	15	2,534
4	21	3,102	10	1,647	17	3,353
5	11	1,380	11	2,215	18	3,058
6	17	2,461	13	2,538	15	2,169
Σ	81	12,159	68	11,372	106	17,295
%	31.76 %	29.78 %	26.67 %	27.85 %	41.57 %	42.36 %

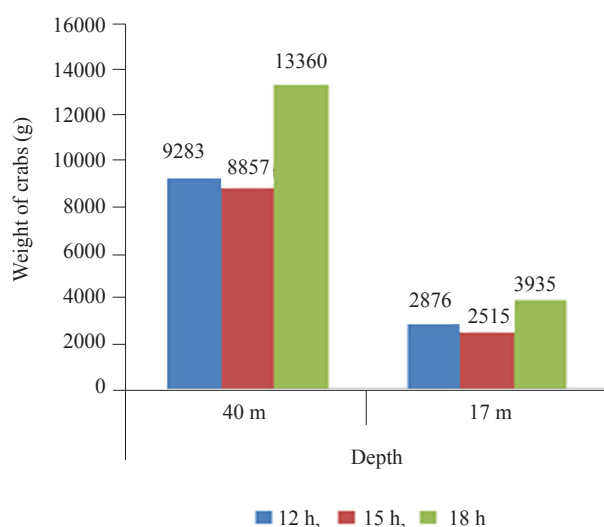


Fig. 3. Total catch of crabs (in terms of weight) at different depths and soaking periods

varied significantly ($p < 0.001$). Fish, crabs and shrimp get caught in traps while catching prey, lured by the bait, or while taking refuge from predators (Martasuganda, 2003). According to Stoner (2004) and Fitri (2011), fish, crabs or shrimps get caught in traps because of the chemical cues in the smell of the bait, when they cannot see the bait with their visual organs, their olfactory organs work more dominantly (Puspito, 2011).

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