

Body components indices variations in European sea urchin *Paracentrotus lividus* (Lamarck, 1871) in Antalya

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Abstract: The edible sea urchin *Paracentrotus lividus* is the most common echinoid species in sublittoral habitats in the Mediterranean Sea. Biometric parameters (spiny test diameter, spiny test length, test diameter, test length and weight) were measured on sea urchins collected from the coast of Antalya. All sea urchins were dissected and indices of gonad and body components were calculated using wet and dry index method. The results of the study showed that mean test diameters of sea urchins were found 72.47 ± 0.84 mm with spines, 45.62 ± 0.80 mm without spines. The body wet weight was between 33.68 and 57.81 g. The gonad lops lengths varied between 19.73 mm and 23.31 mm amongst the total number of echinoids samples. It was determined that total weight of *P. lividus* consisted of 21.69% test, 25.71% perivisceral liquid, 9.17% gut, 4.12% lantern and 5.29% gonad.

Keywords: *Paracentrotus lividus*, Sea urchin, Body indices, Antalya.

Introduction

Gonads are edible part of the sea urchin and sea urchin industry is based on the production of marketable gonads. Therefore gonad yield is an important factor in the commercial exploitation of sea urchins. *Paracentrotus lividus* diameter (horizontal test diameter without spines) can reach 7.5 cm. (Bannet, 1925; Boudouresque et al., 1989; Lozano et al., 1995) and 7.0 cm in Britania, Ireland (Pizzola, 2002) and Turkiye (Kose, 2005).

Sea urchins can adapt their morphological and physiological characteristics according to the environment in which they grow up in (Ebert, 1996). Gonad, gut and test amongst physiological indices can be used to indicate habitat quality and nutritional situation (Murillo-Navaro and Jimenez-Guirado, 2012). Gonad indices of *P. lividus* were 4-5% in Algeria (Soualili and Guillou, 2009), 5-6% (Spirlet et al., 1998) and 6-12% (Spirlet et al., 2000) in Brittany, France, 2-8% in Turkey (Lök and Köse, 2006). Murillo-Navaro and Jimenez-Guirado (2012) reported that the gut index was $7.79 \pm 0.24\%$ in *P. lividus*. In the seagrass bed, the gut index of *P. lividus* without gut contents was $2.0 \pm 0.5\%$ (Fernandez and Boudouresque, 1997). Spirlet et al.,

(1998) demonstrated that the mean gut index was 2.78% according the dry weight method.

This species constitutes a valuable product for the fishery industry in some areas of the region, data is lacking about *P. lividus* in this area. In Turkey, populations of *P. lividus* are abundant in subtidal community and there is not overexploitation like European countries.

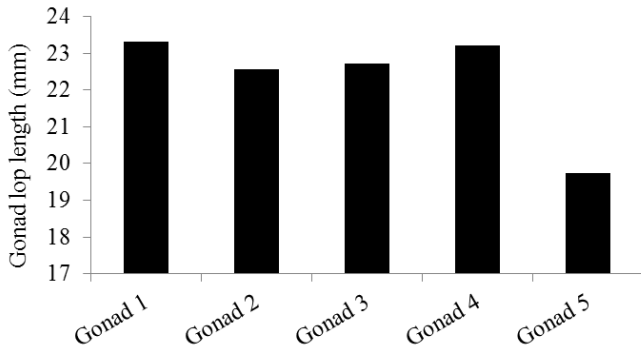
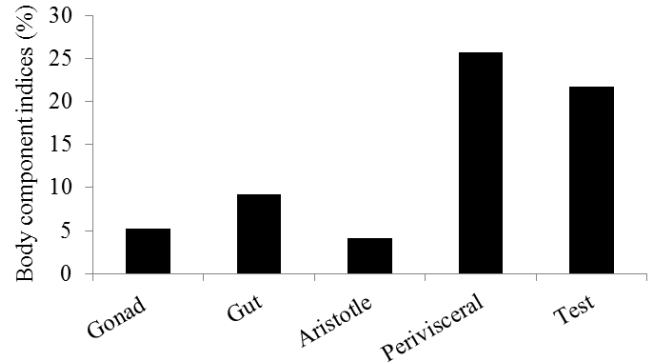
Materials and Methods

Sea urchin individuals, *P. lividus*, were gathered ($36^{\circ}50'00''N$; $30^{\circ}36'00''E$) from Antalya. In the laboratory, biometric parameters (spiny test diameter, spiny test length, test diameter, test length) were measured on sea urchins using Vernier callipers (IP 66-Mitutoyo Absolute). After 5 minute of drainage on a filter paper, each sea urchin was wet-weighted by 0.01 g precision electronic laboratory scales (GE 412 Sartorius). Then, sea urchins were dissected through peristomal membrane and wet body components (gonad lops, gut, Aristotle lantern, perivisceral and test) were weighed separately. Indices of body components were calculated using wet index method (Lawrence et al., 1965).

CI (body component index) (%) = (Wet weight of body

Table 1. Biometric parameters of *Paracentrotus lividus*.

Spiny diameter (mm)	Diameter (mm)	Spiny height (mm)	Height (mm)	Total weight (mm)
72.47±0.84	45.62±0.80	46.80±0.55	27.00±0.44	43.84±1.37

**Figure 1.** Sizes of gonad lop.**Figure 2.** Indices of the body components of *Paracentrotus lividus*.

component / Total wet weight of sea urchin) x 100

Results

The biometric parameters were as illustrated in Table 1. The results of the study showed that mean test diameters of sea urchins were 72.47±0.84 mm with spines, 45.62±0.80 mm without spines. The body wet weight was between 33.68 g and 57.81 g.

The mean gonad lop lengths varied between 19.73±0.67 mm (Gonad 5) and 23.31±0.66 mm (Gonad 1). Minimum gonad lop length was 12.45 mm and maximum was 29.45 mm. (Fig. 1).

Indices of the body components were illustrated in Figure 2. The mean indices of gonad, gut, Aristotle lantern, perivisceral and test were 5.29±0.51%, 9.17±0.61%, 4.84±0.10%, 25.71±0.88% and 21.69±0.52%, respectively.

Discussion

Gonad indices of *P. lividus* gonad indices were changed according to regions, such as 5-6 % (Spirlet et al., 1998) and 6-12% (Spirlet et al., 2000) in Brittany, France, 4-5% for *P. lividus* in Algeria (Soualili and Guillou, 2009). In this study, gonad index (5.29%) was similar the other studies values because the study area was close the other localities.

The physiological indices of echinoid species and the abiotic factors all have an annual cycle and thus, they are all correlated naturally. Murillo-Navarro and Jimenez-Guirado (2012) reported that the gut index was 7.79±0.24% in *P. lividus*. In the seagrass bed, the gut

index of *P. lividus* without gut contents was 2.0±0.5% (Fernandez and Boudouresque, 1997). Spirlet et al., (1998) demonstrated that the mean gut index was 2.78% according the dry weight method. The gut index was higher (9.17%) than those obtained by other researcher, probably cause of environmental effects such as food and temperature.

In all measurements, the first gonad lop length was longest and the fifth gonad lop length was shortest. This difference may be due to difference of gamete release from each gonad lops. Abiotic factors can affect a range of parameters such as growth rate, maximum size, reproduction and body morphology (Lozano et al., 1995). In this study, it is observed that *P. lividus* consisted of 21.69% test, 25.71% perivisceral liquid, 9.17% gut, 4.12 % lantern and 5.29% gonad of total wet weight.

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