

GROWTH RATES OF THE GASTROPOD *TROCHUS NILOTICUS* L. FED FIVE SPECIES OF MACRO-ALGAE

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ABSTRACT

The growth rate of *Trochus niloticus* L. was studied at the Hatchery of the University of Hasanuddin, Barang Lompo Island, South Sulawesi. Growth rate was estimated in terms of shell length and width, using 5 species of freshly chopped macro-algae: *Caulerpa sertularioides* (Vahl) C. Agardh, *Ulva reticulata* Forsskal, *Padina australis* Hauck, *Gracilaria salicornia* (C. Agardh) Dawson, and *Euचेuma denticulatum* (Burman) Collins et Hervey, as feed. The green algae *Ulva* was the best source of food. The growth rates were not significantly different when snails were fed *C. sertularioides*, *P. australis*, *E. denticulatum*, and *G. salicornia*

INTRODUCTION

The Top Shell (*Trochus niloticus* L., 1767) is a valuable marine resource, occurring in the seagrass zone, seaweed zone and in coral reef areas. It is herbivorous, feeding on a variety of micro- and macroalgae. Asano (1990, 1994) and Soekendarsi *et. al.* (1998) identified stomach contents and found a mixture of Chrysophyceae, Chlorophyceae, Cyanophyceae and Rhodophyceae. However, it is unknown whether trochus prefer specific algae and whether different algae have different nutritional value. In this study we compare growth rates when snails were fed five species of freshly chopped algae.

MATERIALS AND METHODS

The study was conducted in the Hasanuddin University Hatchery at the Barang Lompo Island. The stock of *Trochus niloticus* was obtained from the hatchery (Dharma, 1988) Shells measured with 3.00-3.99 cm in shell width. The algae are collected from the shore surrounding the island. Five species of algae were used: *Caulerpa sertularioides* (Vahl) C. Agardh (Chlorophyceae), *Ulva reticulata*

Forsskal (Chlorophyceae), *Padina australis* Hauck (Phaeophyceae), *Gracilaria salicornia* (C. Agardh) Dawson (Rhodophyceae), and *Euचेuma denticulatum* (Burman) Collins et Hervey = *Euचेuma spinosum* (Linnaeus) J. Agardh (Rhodophyceae) (Kadi, 1996; Atmadja, 1996 (a); Atmadja, 1996 (b)). The algae were chopped and fed to trochus placed in a Completely Random Design with 5 treatments and 3 replications. The absolute growth-rate and daily specific growth-rates of shell length and shell width were calculated according to the Hopkins (1992):

Absolute growth rate: $Lagr = Lt - Lo$

Where

$Lagr$ = Absolute growth rate of shell length or shell width

Lo = Shell length or shell width before observation

Lt = Shell length or shell width after observation

Daily Specific growth rate of shell length or shell width

$$Lsgr = \frac{\ln Lt - \ln Lo}{t} \times 100 \%$$

Where

Lsgr = Daily specific growth-rate of shell length or shell width

Lo = Shell length or shell width before observation

Lt = Shell length or shell width after observation

t = Duration

All parameters were measured every 15 days. Statistical analysis was done using a one-way ANOVA followed by Duncan's multiple-range test (Sokal and Rohlf, 1981; Sudjana, 1989).

RESULTS

A good absolute growth was obtained during 60 days when the trochus was fed *U. reticulata*, *C. sertularioides*, *E. denticulatum*, and *G. salicornia*. The lowest increment of shell length was obtained with *P. australis* as a food source (Figure 1).

Since the snails had slightly different sizes at the beginning of the experiment the daily specific growth rates were calculated (Figure 2). It showed that *U. reticulata* gave the highest specific growth rate, which was

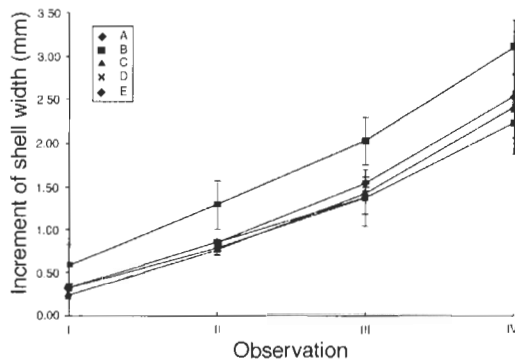


Figure 1. Shell length of *Trochus niloticus* L. Absolute growth rate during 60 days when fed. A = *Caulerpa sertularioides*. B = *Ulva reticulata*. C = *Padina australis*. D = *Gracilaria salicornia*. E = *Eucheuma denticulatum*.

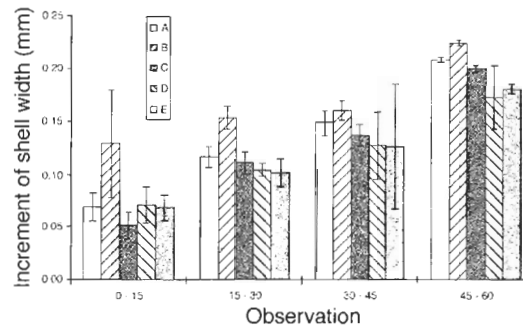


Figure 2. Shell length of *Trochus niloticus* L. Daily specific growth rate during 60 days when fed. A = *Caulerpa sertularioides*. B = *Ulva reticulata*. C = *Padina australis*. D = *Gracilaria salicornia*. E = *Eucheuma denticulatum*.

significantly higher in 4 of the 5 measurements. Compared with *E. denticulatum*, *G. salicornia*, *P. australis* the food value of *C. sertularioides* tended to be higher during the experiment. However, the specific growth rates were not significantly different each other ($P < 0.05$) for the four species

Measurements of the increment of shell width gave the same result as the length measurements did. *U. reticulata* was the best food source ($P < 0.05$), followed by *C. sertularioides*, but in the time interval 30 to

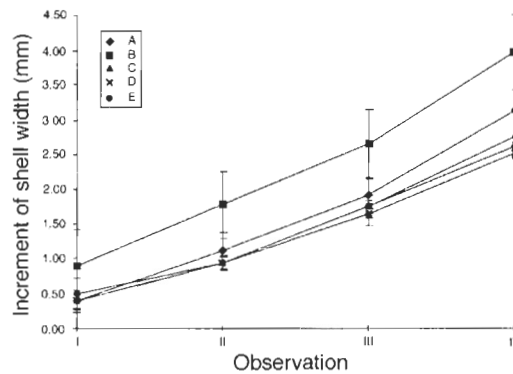


Figure 3. Shell width of *Trochus niloticus* L. Absolute growth rate during 60 days when fed. A = *Caulerpa sertularioides*. B = *Ulva reticulata*. C = *Padina australis*. D = *Gracilaria salicornia*. E = *Eucheuma denticulatum*.

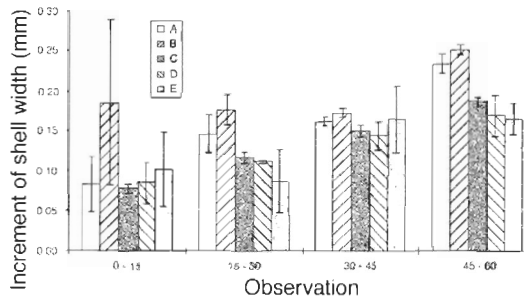


Figure 4. Shell width of *Trochus niloticus* Daily specific growth rate during 60 days when fed. A = *Caulerpa sertularioides*. B = *Ulva reticulata*. C = *Padina australis*. D = *Gracilaria salicornia*. E = *Eucheuma denticulatum*.

45 days the specific growth rates were very similar. During the 60 days of the experiment the growth rates were not significantly different when snails were fed *C. sertularioides*, *P. australis*, *E. denticulatum*, and *G. salicornia*.

DISCUSSION

Generally the growth rate was lowest at the beginning of the nursery period. An increase in growth occurred later because the trochus adapted to the new food and environment. Growth is affected by temperature, salinity, quality and quantity of food, and environmental conditions (Heslinga and Hillman, 1981; Efendie, 1979).

According to Indrawati (1993) and Satari (1996), *Ulva* and *Caulerpa* have high amounts of carotene. Carotene is a basic compound for the production of vitamin A and chitin, which are essential for shell development. The protein compounds found in *Ulva* and *Caulerpa* were similar to other macroalgae, such as *Padina*, *Gracilaria*, and *Eucheuma*. *Ulva* and *Caulerpa* were more soft in texture than *Padina*, *Gracilaria* and *Eucheuma*, which could be a reason why trochus prefers to feed on *Ulva* and *Caulerpa*.

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