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# The effect of snail Pomacea canaliculata nutrition on some plants in ShatAl-Arab River,Basrah,Iraq

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***Abstract*—** The snail *Pomacea canaliculata* (Gastropoda: ampullariidae) is a typical feeder of large aquatic plants in many parts of the world. We conducted laboratory tests to assess aquatic plant consumption in the Shatal-Arab River in Basra south of Iraq. To assess their preference for food, six water plant species were introduced to the snail *P. canaliculata* in a laboratory. This test was carried out between January and December 2017 to determine the feeding rates of some freshwater plans by the *P. canaliculata* gastropod. Snail samples were obtained from aquatic plants from ponds in tidal areas on the shore of the Shatal-Arab River near the Salhiya Canal. *Phragmite australis, Typha domingensis, Bacopa monniera,Lemna minor, Ceratophyllum demersum, Potamogeton crispus.* The temperature and salinity of the water cause disappear of aquatic plants virtually disappears in winter, contributing to lower snail numbers this season. Statistically significant variations ($P < 0.05$) were found in the field collected between snails on five aquatic plants. in this analysis, snails prefer *c. demersum, L. minor* and *P. crispus*, while The number of snails decreased dramatically from *T. domingensis* and *P. australis.*

The findings have shown that the highest food preferences and consumption rates was *P. canaliculata* bred on Lemna, Bacopa, Ceratophyllum and *Potamogetones* but that all snails who obtained *Phragmites* displayed the lowest food consumption rates and the lowest food preference, far different from the others. But *Bacopa, Lemna, Ceratophyllum* and *Potamogeton* are not available because of their intake.

***Keyword:*** *snail, freshwater plant, feeding , invasive*

## Introduction

Snail *Pomacea canaliculata* comes from South America 's tropical Estebenet& Martín, 2003. Its diet is comprised of periphytons, macrophytes, waste and organic substances and changes its dietary preference during aging, revealing preference to juvenile algae and large aquatic plants as adults (Hirai, 1988). Mollusc ecosystems contain many aquatic species, and their nutrient requirements are mainly dictated by the availability of nitrogen, the presence of dry matter, protective substances and plant phenolic compounds (Qui & Kwong, 2009; Wong et al . , 2010; Qui et al., 2011).This snails also eat some plants like *Colocasia esculenta* (Qui andKwong, 2009) and *Oryze sativa* (Halwart, 1994) .

The *P. canaliculata* freshwater snail lives in the waters of temperate South America and maybe even the Amazon Basin. It is one of several species commonly known as "apple snails" in the Ampullariidae family. Deliberate use of apple snails as food resources has led to effective invasions in many regions , especially in

South-East Asia (Acosta and Pullin, 1991; Naylor, 1996). Biological controls of well submerged aquatic plants have been investigated by using different organisms such as insects species (Newman, 2004; Sullivan et al . , 2011; Center et al., 2013),microorganisms (Borges Neto and Pitelli, 2004) and molluscs (Lach et al., 2000; Wong et al., 2010).

This study assesses *P. canaliculata* feeding rates of some common plants in the Shatal-Arab River areas near the Salhiya Canal in Basra, Iraq.

## Material and methods

For the measurement of snail numbers in these areas, a simple random sample was taken monthly; three random replicates were collected from January to December 2017, snails are isolated by hand and counted in the low tide period. These samples were taken to a laboratory in which all species are kept for identification and research in the aquarium.

Six species of plants, *Typha domingensis*, *Phragmites australis*, *bacoba minniera*, *Lemna Minor*, *Ceratophyllum demersum and Potamogeton crispus*. Collected from tidal areas along the Shatal-Arab River in the city of Shatt al-Arab, near Salhiya Canal. We used a square of 1/2 $m^2$ to measure the density of a snail and to pull the plants through a fork.

Identified and counted snails according to Estebenet and Martín,2003 . Identification is based on shell morphology (Simone, 2006) and egg-clutch characteristics (Estebenet and Cazzaniga, 1993). Both physical and chemical parameters estimated by ySI meters include pH , water temperatures, dissolved oxygen and salinity .

Various measurements were determined according to the measurement information, including shell length , width and aperture length and width.

The snail *P. canaliculata* consumption and preference for feeding in aquatic plants were evaluated by conducting research.

After the snails were collected, they were put in tap water with 1.5 – 2.4 PPt salinity and $25^{o}$ C temperature and starved for at least 24 hours until experimentation . For experiments with food selection or intakeswere collected for six different types of plants : *Typha domingensis, Phragmites australis, Bacopa monniera, Lemna minor, Ceratophyllum demersum* and *Potamogeton crispus* .

In a measure of aquatic plants consumption, they were produced separately to the snails. A plastic container with a liter of water was used and adult snails were used in consumption testing [25-35 mm (SL)], and then 10 grams of biomass was added to snails for each form of aquatic plant. For plant weight, excess water accumulated in the adsorbent paper and biomass measured by digital scale . The test was performed for 14 days and every 24 hours plants were evaluated. The remaining biomass was measured and disposed of in each assessment. Snail subsequently implemented a new quantity of 10 grams for another 24 hours and performed seven assessments. Each vial was an experimental unit and containers were arranged with four replicates in a completely random arrangement.

The biomass reduction of aquatic plants was measured in relation to the amount provided at the beginning to the snail. At the end of the experiment, these data were submitted for variance analysis and compared with the test Tukey at 5% probability.

## Results

In the study site basins, the values of the water parameter varied in each month and samples were collected (ANOVA, p>0,05). Dissolved oxygen and pH ranged from 8.4 to 4.7 mg / l and 7.76 to 8.27 and pH between months of study showed no difference. Salinity differed significantly between the study months; winter months had the lowest levels reported and summer months had the highest ($p < 0.05$). In the winter months, the lowest value of temperature was recorded (15 ° C) and the highest in the summer months (34 ° C) ($P < 0.05$).

**Table1: Physical and chemical parameters in the Shatal-Arab River intertidal zone .**

| Months | D.O mg/l | Ph | Salinity ppt. | Temperature $^{o}$c |
|---|---|---|---|---|
| January, 2017 | 8.6 | 8.2 | 1.8 | 15 |
| February | 8.5 | 8.4 | 1.9 | 19 |
| March | 8.3 | 8.5 | 2.1 | 21 |
| April | 7.5 | 7.8 | 2.5 | 26 |
| May | 6.4 | 7.6 | 3.5 | 29 |
| June | 5.8 | 8.1 | 4.7 | 33 |
| July | 5.5 | 8.0 | 5.6 | 34 |
| August | 5.2 | 8.4 | 6.5 | 29 |
| September | 6.0 | 7.7 | 6.5 | 27 |
| October | 6.2 | 7.9 | 6.2 | 26 |
| November | 6.8 | 7.6 | 3.7 | 25 |
| December | 7.8 | 7.8 | 3.1 | 21 |

In the sample region the density of snails ranged from 10 to 38 individuals / m2 for all months of the study . Highest densities were recorded on the study site during the summer months, while lowest densities were observed most of the winter months from January 2017 to March 2017.

Snail *P. canaliculates* reported higher intakes of *Lemna minor, Bacopa monniera, Ceratophyllum demersum* and *Potamogeton crispus* at 24-hour exposures on average 7.42 ± 3.7 g / day, 5.66 ± 1.8 g / day, 3.84 ± 2.1 2.86 ± 3.9 g / day. This value was considerably higher than that of other plants. In comparison, the intake of *Typha domingensis* was 0,87 + 0,96 g per day, which was statistically higher than the other plant submitted to *Phragmites australis*. Average *Phragmites australis* intake was 0.19 ± 0.04 g / day in a 24-hour period and substantial variations were observed with a 5 percent probability Tokey test.

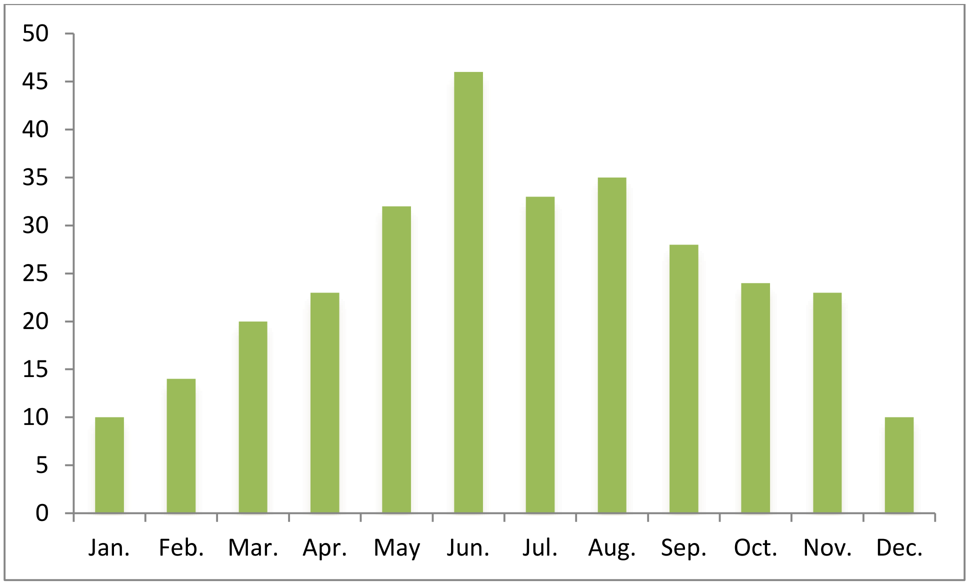


**Figure 1: Population density (indi / m$^2$) of *P. canaliculata* in the tidal zone on the river Al-Arab between January and December 2017.**

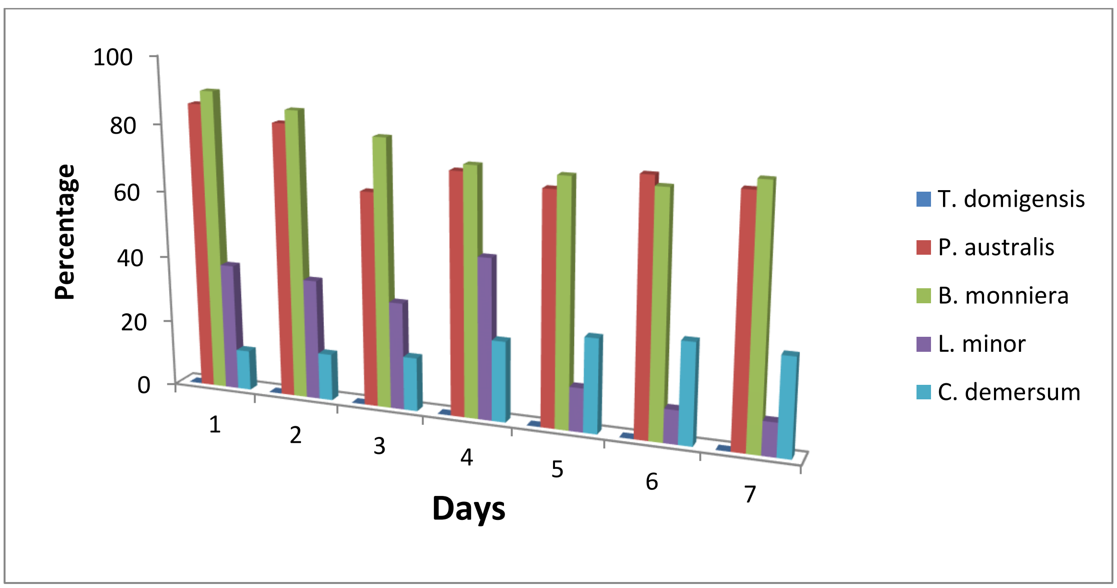


**Figure2: Percentage of aquatic macrophytes consumption by snail *P. canaliculata* in a single week laboratory experiment simultaneously.**

## Discussion

The intake of *P. canaliculata*, according to Carlson and La Crociere (2005), was lower than that of the *L. minor* (5,4 g / day), and also of *C. demersum* (6.51 g / day),preferred by *P. insularium* (Baker et al., 2010). These variations relate to environmental experimental conditions and snail size.

There was a disparity between the six plants studied in reducing the biomass supplied. The mean biomass reduction from L. Minor 82.37±5.18 and *B. Monniera* was 75,25 ± 9,53%, while *P. crispus* was 33,53 ± 8,24%, 27,27 ± 9,94%, for *C. demersum*. In two more forms of nutrition the amounts consumed during the 24-hour cycle were significantly different and the intake ratio was almost the same in the observation period. For the *P. crispus* relationship in the experimental period with *C. demersum*, deeper changes occurred. Consumption on the first day of *C. demersum* was higher than *P. crispus* intake. Relative intake reversed on fifth, sixth and seventh days, with higher *P. crispus* fed relative to *C. demersum*. The amounts of these two forms consumed indicate minor variations.

Snails fed on L. minor and *B. Monniera* during the incubation period (14 days) had the biggest changes in body weight with a 0.65 g / day and 0.58 g / day rise on average, respectively. Feeding animals on *C. demersum* and *P. crispus* decreased their weight by 0.15 g and 0.12 g / day. snails feeding *P. australis* showed a modest weight gain: 0.049 g / day.

*P. canaliculat*a found was High-grazing and low-selective herbivores (Lach et al. 2000; Carlson and La Corsiere, 2005; Carlson and Brunmark, 2006). Food preference may be present in L. minor.

This research therefore provides similar findings to those found by other authors (Estebenet, 1995; Lach et al . 2000; Carlsson & Lacoursière, 2005; Carlsson & Brönmark, 2006) and shows that *P. canaliculata* chooses their food actively and exhibits an apparent preference for certain macrophytes.

The results of these experiments allow us to infer that the biological regulation of L. minor is possible with this snail by techniques for repositioning.

In the analysis we thus concluded that *P. canaliculata* has the ability to use it for the control of submerged water macrophytes as a biological combating.

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