Growth and survival of *Macrobrachium americanum* Bate, 1868 juvenile prawns (Crustacea, Decapoda, Palaemonidae) stocked in tanks at different sizes

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There has been a global expansion of freshwater shrimp farming since 1995, but production mostly consisted of *Macrobrachium rosenbergii* (D’Abramo *et al.* 2003, New 2005). There are techniques for its production that may serve as guidelines to develop technology for cogeneric species, but biological differences may mean different requirements (García Guerrero and Apun 2008). Thus, studies on new species with potential for aquaculture should be performed. *Macrobrachium americanum* from the western continental shelf of Middle America is an example. The demand for this edible shrimp cannot be supplied by fisheries. It is large with the maximum sizes according to Kensler *et al.* (1974) being 450g for males (Figure 1) and 225 g for females (Figure 2). Some effort to start its culture have begun, but a considerable amount of information is uncertain or unavailable. Prior to the determination of the demand, it will be necessary to establish whether it can actually be cultured profitably (Garcia Guerrero and Apun, 2008). First efforts must focus on the capture and acclimation of wild specimens to the culture environment. Many farms are unproductive simply because they are farming inadequate stocks (Jerry *et al.* 2005). Hence, customization of the animals to culture conditions is necessary. Because stocks of similar age may vary in size, the effect of stocking size was selected as a primary aspect to evaluate. The purpose of this article was to assess the growth and survival of *M. americanum* juveniles (Figure 3) stocked at different sizes in experimental tanks.

**Study Materials and Methods**

Juveniles were caught with a dragnet in the Sinaloa River (Figure 4) located in the state of Sinaloa, Mexico (25°57’N, 108°51’W). The river flows in a semitropical valley with an average water temperature of 24.1°C (min, 0.5; max, 44.5°C) and average rainfall is 938.5 mm/yr with total hardness of 83 mg/L CaCO₃ (Muñoz and Escobedo 2005). Damaged juveniles, as well as those out of the proper size range (smaller than 0.06 g or larger than 0.30 g) or not positively identified as *M. americanum* (Hendrickx 1995), were discarded. In the laboratory, they were individu-

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**Fig. 1.** Adult male prawn of *Macrobrachium americanum* (Bate 1868) from Sinaloa River.

**Fig. 2.** Adult female prawns of *Macrobrachium americanum* (Bate 1868) from Sinaloa River.
ally weighed and divided into three groups depending on weight (group 1 = 0.06 to 0.10 g; group 2 = 0.11 to 0.20 g; group 3 = 0.21 to 0.30 g). Three hundred in each weight group were placed in three replicates of 100 juveniles each. Replicates consisted of permanently aerated round plastic tanks with 800 L of filtered freshwater and pieces of plastic net to provide shade and shelter (Figure 5). Shrimp were counted and individually weighed every 14 days. They were maintained for 84 days and fed with pellets (Purina® 35 percent protein) ad libitum every 12 hours at dawn and dusk. Tanks were kept indoors at room temperature (24-27°C) with a photoperiod of 12:12 (sunlight only). Dead prawns and uneaten food were removed daily during the water exchange (20 percent). Differences in survival among treatments with time and weight change over time within the same stocking size group were established by one-way ANOVA (Zar 1999).

Results

Shrimp survival is summarized in Table 1. Stocking weight seemed to have an effect on survival with highest survival at higher stocking weights. Average weight versus time per group is shown in Table 2. The only group with a significant weight increase throughout the complete trial was group 3 ($F=185.55$) while groups 1 ($F=117.14$) and 2 ($F=101.21$), had no continuous significant differences in weight during the trial (one-way ANOVA).

Discussion

Stocking size may influence prawn production (D’Abramo et al. 1989, Tidwell et al. 2004) as shown in this study. The larger the juveniles at the beginning of the trial, the higher the survival. In addition, juveniles in the largest size group treatment were the only ones with statistically significant differences in growth during the trial (Table 2), a fact which suggest easier adaptation ability with increased size. D’Abramo et al. (1989, 1991) affirmed that a higher stocking weight of shrimp ultimately increased production. Tidwell et al. (2003) found that stocking larger juveniles significantly increased the percentage of animals that achieved harvest size. In agreement with previous works with shrimp (D’ Abramo et al. 2000), to minimize the risk of disease, it appears that larger juveniles may have better developed defense systems and, thus, are more resistant to threats (Prayinto and Latchford 1995). This would allow higher survival rates to be more achievable (Samocha et al. 2000). So, stocking larger animals possibly will improve growth and survival.

Comparison of the present results with other studies are difficult because there is no known prior work on this topic for *M. americanum*. Some studies on *M. rosenbergii* are slightly comparable despite differences in species and management. New (2002) reported that *M. rosenbergii* juveniles with a stocking weight of 0.01-0.3 g can grow in an indoor nursery 5-30 mg/day over periods between 60-75 days. However, juvenile growth in the present work seems to be slower in comparison to those presented by New (2002), who stated that 0.25 g juveniles reached an aver-
age of nearly 34 g in 132 days when stocked in temperate ponds. This suggests that, in the present study, the growth rate may have been slower because of crowding. Space limitation may severely restrict growth in crustaceans (D’Abramo et al. 2000). Management details and diet information were not provided by New (2002), but it is believed that juveniles grow better in ponds. Despite species and management differences, *M. americanum* juveniles should be stocked in experimental ponds as a next step. Future research should be focused on the effects of such variables as density, temperature and diet, that will help determine the success potential with respect to the culture of *M. americanum*.

**Notes**

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**References**


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eries industries and it lives on to provide new, science-based information and to demonstrate these new technologies for state-of-the-art food and fiber production methods such as aquaculture. Simply put, the role of the aquaculture demonstration project is to help people change.

Notes

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Juvenile Prawns


Reference