DOMESTIC AQUAPONICS IN ANÁPOLIS: PRODUCTION OF TILAPIA AND TAMBACU

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ABSTRACT

Aquaponics is a method of growing food that involves the integration of aquaculture and hydroponics in water and nutrient recirculation systems. It presents itself as a real alternative for food production with less impact on the environment, due to its sustainability characteristics. The objective of this study was to develop and implement a fish farming project for tilapia and tambacu in a reservoir of up to 1,000 liters to evaluate fish growth. The project was carried out in the outdoor area of the UniEVANGÉLICA Veterinary Clinic, located in the urban center of Anápolis. The fish farming systems were set up and adapted to include the following components: fish pond, biological filter, and water pump. After 100 days of monitoring, the weight gain of the tilapia was 10 times greater than that of the tambacu. It is possible that the climate of Anápolis is not favorable for the cultivation of tambacu in a domestic fish farming system.

Keywords: fish farming; sustainability; tambacu; tilapia.

INTRODUCTION

According to EMBRAPA (2013), world population growth results in an increasing demand for water and food. This puts enormous pressure on the sectors involved in food production, requiring better results in less physical space and time. Thus, the search for sustainable production practices has come to be seen as a necessity.

This need has led researchers to develop systems such as fish farming in small water reservoirs, sometimes even associated with vegetable production. The latter is known as aquaponics (HUNDLEY, 2013).

According to HUNDLEY (2013), with current technology, we can produce fish at high densities. Tilapia, for example, is a very rustic and resistant fish species, with

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good feed conversion and tolerance to high stocking densities, and has been widely used.

However, the Brazilian market is also interested in consuming other species, such as tambacu, a hybrid fish that is widely marketed. This fish is a cross between tambaqui and pacu. This crossbreeding has given the offspring favorable characteristics, such as resistance to low temperatures and robustness. However, the hybrid and the parent species prefer warmer waters when compared to other species (Barros et al., 2019).

In this context, aquaponics is a technology that can be better exploited in our environment, since both products are desired by the local market (OLIVEIRA et al., 2010). Given the current need to develop sustainable activities, aquaponics is a low-cost tool with quick results for application in educational systems. Therefore, this study aimed to implement a domestic aquaculture project with the intercropping of tilapia and vegetables, as well as to evaluate the productive performance of the animals at two different population densities.

METHODOLOGY

The project was carried out between February and May 2024, near the UniEVANGÉLICA Veterinary Clinic, located in the experimental area of the Anápolis unit (EXPERIMENTAL UNIT OF THE CERRADO – VER. ARTHUR WESLEY ARCHIBALD).

The fish farming systems were set up and adapted to include the following components: fish pond, biological filter, and water pump. The ponds were made of polyethylene tanks with a capacity of 1,000 liters. A piping system was installed to remove water containing solid waste. This water was sent through a submersible pump (with a pumping capacity of 1,000 liters/hour) to a microbiological filter made of gravel, where, after filtration, it returned to the system. Water lost through evaporation was replaced whenever necessary.

After assembling the two systems and 10 days of operation, the following distribution was established in System 1 (S1) and System 2 (S2): 20 tilapia fry were released in S1, while 20 tambacu fry were released in S2. Biometric management

was performed on the fish on the day they were released and then monthly until they reached 100 days, when the experiment was terminated.

The fish were fed commercial feed containing 36% crude protein and 3,200 Kcal/kg daily at 2:00 p.m., at a rate of 10% of the fish's live weight. The feed rate was adjusted monthly after biometry.

Water quality parameters such as temperature, oxygen, transparency, and pH were measured at the beginning and end of the process using rapid colorimetric test kits in situ, always performed at 2:00 p.m.

After the experiment was completed, the animals were slaughtered and used for food technology and production classes. The data obtained were compiled in a spreadsheet to continue quantitative and descriptive statistical evaluations.

RESULTS

With regard to the fish, in S1, 20 tilapia with an initial average weight of 49 grams and a total weight of 980 grams were released, while in S2, 20 tambacu fingerlings with an average weight of 20.33 grams and a total weight of 406 grams were released. At the end of the 100-day study, in S1 there were 17 fish (mortality of 15%) with a final total weight of 2,220 grams and an average weight of 130.59 grams. In S2, there were 20 fish, with a mortality rate of 0% and a final total weight of 524 grams, with an average weight of 26.2 grams.

The total weight gain of fish in S1 was 1,240 grams and the total weight gain in S2 was 118 grams. The average weight gain was 72.94 and 1.77 for S1 and S2, respectively. The results of the water quality and fish weight tests are presented in Table 1.

Table 1. Production and water quality data at the beginning and end of the experiment with tilapia and tambacu.

Factors evaluated	System 1 Tilapia		System 2 Tambacu	
	Day zero	Day +100	Day zero	Day +100
Number of fish	20	17	20	20
Average weight of fish (grams)	49	130.59	20.3	26.2

Total fish weight (grams)	98	2,220	406	524
Fish mortality (%)		15		0
Water temperature (°C)	29	31	29	31
O2 dissolved in water (ppm)	14	14	11	11
Water pH	7.2	7.2	7.0	7
Water transparency (cm)	40	32	42	43

CONCLUSION

With regard to fish, it can be observed that the average and individual weight gain of tilapia was higher than that obtained by tambacu. This may have been due to characteristics related to the tambacu species, since it is a Brazilian fish adapted to regions with a hot climate, and such requirements are not met in a city like Anápolis, which is considered to have a milder climate, as it is located at an altitude of about 1,000 meters and has an average temperature two degrees below that observed in the capital, Goiânia, which is located at an altitude of 600 meters.

Taking into account the total weight gain at the end of the 100-day study, it can be observed that tilapia are more adapted to the local climate, resulting in a total weight gain of 1,240 grams, which is about 10 times more than the weight gain observed in tambacu, which gained 118 grams. These data lead to the conclusion that each tilapia gained an average of 72.94 grams during the 100 days, which was noticeable to the naked eye, as there was an increase in the size of the fish, while each tambacu gained about 5.9 grams after 100 days, and visually it was not possible to observe growth in these fish.

With regard to mortality rates, there were no deaths among tambacu, but a mortality rate of 15% was recorded for tilapia. The deaths occurred in the first few days after handling. The higher survival rate of tambacu is possibly due to the fact that it is a hybrid.

With regard to water, the results for transparency, pH, dissolved oxygen, and temperature were similar at the beginning and end of the tests in S1 and S2. These factors were not considered to have interfered with the research results.

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