



[ANIMAL HEALTH & WELFARE \(/ADVOCATE/CATEGORY/ANIMAL-HEALTH-WELFARE/\)](/ADVOCATE/CATEGORY/ANIMAL-HEALTH-WELFARE/)

Salinity tolerance of Gulf corvina, prospective aquaculture species

Saturday, 2 November 2013

By Martin Perez-Velazquez, Ph.D. , Mayra Lizett González-Félix, Ph.D. , Perla Urquidez-Bejarano, B.S. and Christian Minjarez-Osorio, M.S.

Euryhaline nature of species could enhance its status as a candidate

The Gulf corvina (*Cynoscion othonopterus*) is a fish species of commercial importance that supports a fishery of over 3,000 metric tons (MT) annual production in the Gulf of California off Mexico. Because of the high quality of the fresh fillets and high consumer acceptance in a well-established local market, the Gulf corvina is currently being evaluated as a prospective species for aquaculture in northwest Mexico, where grow-out trials in sea cages and ponds are being conducted.



Juvenile Gulf corvina. The species is being evaluated as a prospective species for aquaculture in northwest Mexico.

Euryhaline species

The Gulf corvina is a relative of the red drum (*Sciaenops ocellatus*) for it belongs to the same family, Sciaenidae. Many members of this family of fish are recognized for being “euryhaline” or capable of tolerating wide ranges of environmental salinity. In this respect, the Gulf corvina is well known for performing a seasonal reproductive migration to the Colorado River Delta in the northern portion of the Gulf of California, where the freshwater Colorado River flows into the gulf and decreases environmental salinity to provide adequate spawning and nursing grounds for this species.

This physiological characteristic can be advantageous for the diversification of production sites at which the fish can be cultured. To evaluate the salinity tolerance of Gulf corvina, the authors exposed juvenile fish to varying levels of environmental salinity.

Experimental study

A six-week study was conducted at the University of Sonora's Wet Laboratory of Aquaculture Nutrition of the Kino Bay Experiment Station at Kino Bay, Sonora, Mexico. Gulf corvina juveniles with individual mean initial weights of 17.2 grams were stocked into circular 250-L tanks at a rate of 6 fish/tank. Salinity treatments of 5, 15, 25 and 35 ppt, each run in triplicate, were tested in a completely randomized design experiment.

Fifty percent of the water volume in each tank was replaced daily with new clean, filtered water of the corresponding salinity. The overall levels of dissolved oxygen, temperature and pH were maintained at 6.8 mg/L, 26.2 degrees-C and 7.6, respectively – all adequate for fish culture. All fish were fed a commercial feed with crude protein and lipid contents of 46 and 14 percent, respectively.

At the end of the trial, fish were group weighed and counted to estimate growth and survival rates. In addition, blood was drawn from the caudal veins of all fish and centrifuged to separate plasma from cells. Plasma osmolality, an estimation of the concentration of substances in the plasma, was measured with an osmometer. In addition, the osmolality of the culture water was measured.

Plasma osmolality has been shown to be a physiological indicator of osmotic stress in fish. For example, it can be altered rapidly and acutely in fish not able to adapt to changes in salinity, while it tends to remain relatively stable in fish that cope well with variations in salinity.

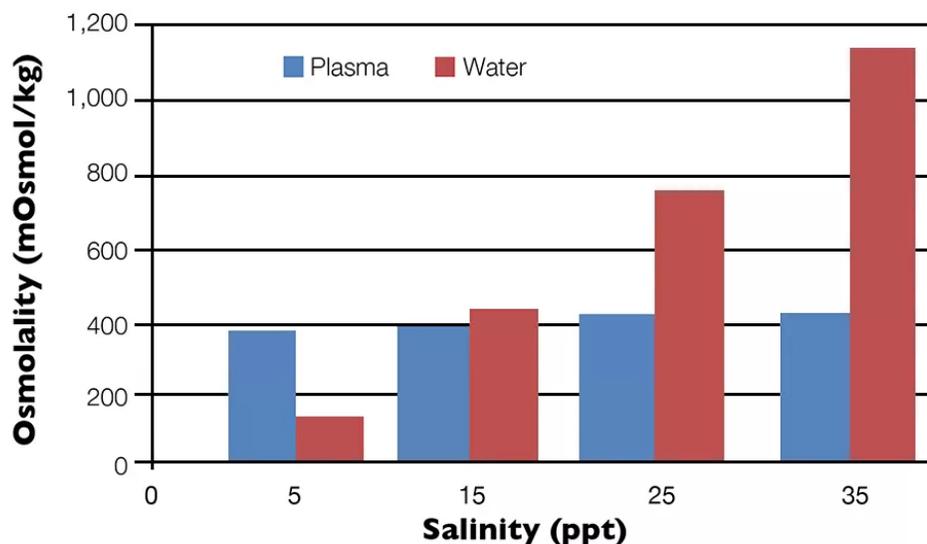
Results

High survival rates of 83, 89, and 87 and 100 percent were observed in fish held at salinities of 5, 15, 25 and 35 ppt, respectively, without statistical differences among them. The weight gains of the fish, which ranged from 46.4 to 73.3 percent, also reflected no statistical difference among treatments.

The fact that comparable growth and survival of fish were recorded at all salinities was indicative of adaptation to the varied conditions. This was further supported by the physiological response of the fishes' plasma osmolality, which, in spite of the increasing osmolality of the culture water at higher salinities, remained nearly constant, as shown in Figure 1. This pattern of stable plasma osmolality and unaltered growth and survival in response to salinity stress is typical of euryhaline fish such as salmonids and some flatfish.

The results of this study, to the authors' knowledge the first set of data gathered experimentally on the salinity tolerance of Gulf corvina, confirmed the euryhaline nature of the species. As related to aquaculture, euryhalinity offers the advantage of culturing fish at production sites where brackish or low-salinity water is available, either by the sea or even at facilities far away from coastlines.

However, before this becomes a reality, further aspects of the salinity tolerance of this species must be evaluated, such as long-term exposure to varying salinities, preferably with grow-out trials until fish of marketable are obtained, using floating cages or other infrastructure for commercial culture.





Testing at the University of Sonora measured plasma osmolality, a physio-logical indicator of stress in fish.

Fig. 1: Osmolality values of culture water and blood plasma of Gulf corvina exposed to different salinities.

(Editor's Note: This article was originally published in the November/December 2013 print edition of the Global Aquaculture Advocate.)

Authors



MARTIN PEREZ-VELAZQUEZ, PH.D.

Departamento de Investigaciones Científicas y Tecnológicas
Universidad de Sonora
Edificio 7-G, Blvd.
Luis Donaldo Colosios/ne/Sahuaripa y Reforma
Col. Centro, C.P. 83000
Hermosillo, Sonora, México
mperezv@dictus.uson.mx (<mailto:mperezv@dictus.uson.mx>)



MAYRA LIZETT GONZÁLEZ-FÉLIX, PH.D.

Departamento de Investigaciones Científicas y Tecnológicas
Universidad de Sonora
Edificio 7-G, Blvd.
Luis Donaldo Colosios/ne/Sahuaripa y Reforma
Col. Centro, C.P. 83000
Hermosillo, Sonora, México



PERLA URQUIDEZ-BEJARANO, B.S.

Departamento de Investigaciones Científicas y Tecnológicas
Universidad de Sonora
Edificio 7-G, Blvd.
Luis Donaldo Colosios/ne/Sahuaripa y Reforma
Col. Centro, C.P. 83000
Hermosillo, Sonora, México



CHRISTIAN MINJAREZ-OSORIO, M.S.

Departamento de Investigaciones Científicas y Tecnológicas
Universidad de Sonora
Edificio 7-G, Blvd.
Luis Donaldo Colosios/ne/Sahuaripa y Reforma
Col. Centro, C.P. 83000
Hermosillo, Sonora, México

Copyright © 2016–2018
Global Aquaculture Alliance