

Fighting Conch, *Strombus alatus* and *Strombus pugilus*: New Food Candidates for Aquaculture

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ABSTRACT

The Florida fighting conch, *Strombus alatus*, is found on the east and west coast of Florida. The closely related West Indian fighting conch, *S. pugilus*, ranges from Florida through the Caribbean region. These conch are in the same genus as the popular fisheries and commercial species, the queen conch, *S. gigas*. These herbivorous gastropods reside in shallow seagrass beds or sand flats. The adults reach sexual maturity at 6-8 cm shell length in approximately 1-2 years. Both species lay egg masses in captivity and are regularly cultured through to the juvenile stage at Harbor Branch Oceanographic Institution. The fighting conch species are being evaluated as a potential food species. These conch have many of the same characteristics as the queen conch in terms of taste and meat appearance. However, the fighting conch have some added qualities, such as faster growth, a tolerance to variable water quality, and they are not CITES regulated. These attributes make the fighting conch a promising candidate for the food market.

KEYWORDS: Conch, food, *Strombus*

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La concha de la Florida, *Strombus alatus*, es encontrado sobre la costa de este y de Oeste de Florida. Es estrechamente relacionado a el West Indian concha, *S. pugilus*, variedades de Florida por la región caribeña. Estas concha están en el mismo género que la industria pescadera popular y especies comerciales, la concha de reina, *S. gigas*. Estos gastropods herbívoros residen en camas playas seagrass o pisos de arena. Los adultos alcanzan la madurez sexual al 6-8 cm longitud de cáscara en aproximadamente 1-2 años. Tanto las especies ponen masas de huevo en el cautiverio como son con regularidad cultivadas por a la etapa juvenil en Harbor Branch Oceanographic Institution. Las especies de concha están siendo evaluadas como una especie de alimento potencial. Estos concha tienen muchas de las mismas características que la concha de reina en términos del aspecto de carne y gusto. Sin embargo, la concha de enfrentamientos tienen algunas calidades añadidas, como el crecimiento más rápido, una tolerancia a la calidad variable de agua, y ellos no son CITES regulado. Estos atributos hacen la concha de enfrentamientos un candidato prometedor por el mercado de alimento.

INTRODUCTION

There are seven conch species in the Florida, Caribbean, and South American coastal regions that belong to the family Strombidae. The most valuable commercial and subsistence fisheries species is the queen conch, *Strombus gigas*. There has been much focus on the aquaculture of queen conch for the food markets (Berg 1976, Davis 1994, 2000). However, the commercial production of other *Strombus* species for the food market has been overlooked. Two of the species; Florida fighting conch, *S. alatus*, and the West Indian fighting conch, *S. pugilus*, may prove to be alternatives to the queen conch food market. A conch production hatchery owned by Oceans, Reefs and Aquariums (ORA) located at Harbor Branch Oceanographic Institution (HBOI) in Ft. Pierce, FL, produces Florida fighting conch for the aquarium trade. The potential for the fighting conch to be raised as a food species is also being explored. This paper discusses raising the fighting conch species for the food market.

NATURAL HISTORY

The Florida fighting conch can be found from the coasts of North Carolina to south Florida and throughout the Gulf of Mexico. The West Indian fighting conch resides from the south Florida waters throughout the Caribbean basin. Both species are smaller in size (7 – 10 cm shell length (SL)), compared to queen conch, and will reach sexual maturity at approximately one year of age (Davis pers. obs. 2001). Fighting conch are herbivorous and feed on diatoms and a variety of other epiphytic algae growing on sand grains and seagrass blades. They reside in deep water of 10 m or greater in the winter, and communally migrate to shallow waters (2 m) during the summer months to spawn (D'Asaro 1986).

Fighting conch are sexually dimorphic, and reproduce by internal fertilization. These animals demonstrate a mating behavior unique to their species. The males have a tendency to guard an egg laying female and will challenge any male who attempts to mate with her (Bradshaw-Hawkins and Sander 1981, Shawl and Spring 2003, Shawl and Davis in review). The challenge occurs in the form of a jousting tournament with their proboscis', hence the name "fighting" conch. The female will lay a crescent shape egg mass 4 – 9 cm long, which may contain up to 182,000 eggs (D'Asaro 1986, Shawl and Davis In review). The larvae hatch after a three-day incubation period as free swimming veligers with ciliated lobes used for feeding, respiration, and locomotion (Shawl and Spring 2003). After 21 days, a chemical or algal cue induces the veligers to settle out of the water column and undergo metamorphosis. During metamorphosis, the conch will lose their larval lobes, and begin to utilize their gills. Immediately, the juvenile fighting conch (1 mm SL at metamorphosis) will begin crawling around in search of algae and diatoms. They will continue to add length to their shell until they reach sexual maturity, then they will begin to flare their lip.

AQUACULTURE

Since 2000, Florida fighting conch have been bred in captivity and cultured specifically for the aquarium market in the ORA hatchery at HBOI. Scientists at HBOI pioneered the methods now used for breeding conch in captivity. Wild broodstock were collected from Gulf and Atlantic Florida and placed in captive breeding tanks. Egg masses collected from these animals are hatched in a larval culture system. Newly hatched veligers are fed microscopic algae for three weeks until they are ready to undergo metamorphosis. After metamorphosis, their diet is switched from planktonic algae to a settled diatom. One month later the tiny juveniles are moved again to a custom designed grow-out system. The conch are raised on aragonite sand for the greatest shell growth, and will reach aquarium market size (30 mm SL) after a few months of feeding on a specially prepared diet (Shawl and Spring 2003).

FOOD MARKET

Conch meat is sweet, tender, protein rich, and contains no saturated fat (Davis 2000). Queen conch for the food market are only cultured at one location, the Caicos Conch Farm, in the Turks and Caicos Islands. New markets are established for smaller sized queen conch (6 – 10 cm SL) (Hesse pers. comm. 1999). These conch are served in traditional escargot dishes, bouillabaisse, paellas, and gumbos (Davis 2000). They are also served ceviche style, tempura, and are boiled or steamed to be served as medallions.

Fighting conch have similar characteristics as the queen conch in terms of taste and meat appearance. However, there are other attributes of the fighting conch which make them a promising species for the food market. For example, the juvenile fighting conch raised in captivity grow at a faster rate than queen conch juveniles raised in the same systems (Shawl et al. In press). The faster growth rate would mean an earlier market date. The juveniles are also more tolerant to fluctuating water quality variables. The fighting conch larvae in particular, are very hardy in comparison to queen conch larvae (Davis and Shawl Pers. obs. 2000). They are able to withstand lower salinities and lower temperatures. Lastly, the fighting conch are not a CITES permitted specie, which makes the collection, sale, and trade of the animal more convenient for everyone involved.

The fighting conch have tremendous potential to be a new aquaculture species for the food market. Production research on the feasibility of raising large numbers of fighting conch in captivity will continue. A market analysis will also explore using this species as an alternative and supplement to the queen conch food market.

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