

Potential use of freshwater clams in Tabasco, Mexico for producing pearls and other products

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Worldwide, the pearl industry has been sustained — and dominated — by a few species of marine bivalves that belong to the genus *Pinctada*: *P. fucata*, *P. margaritifera* and *P. maxima*, and to a lesser extent, to the genus *Pteria*: *Pteria penguin* and *Pteria sterna* (Haws 2002). This situation has been changing over recent decades since the global pearl industry has diversified and expanded into market segments where other kinds of pearls are experiencing increasing importance (Southgate 2007). This is the case with freshwater pearls, also called rice-type pearls, because they are formed only by a grafted saibo, not a round nucleus. While this kind of pearl was originally cultivated in Japan around 1910 in the Biwa River (and were therefore called “biwa” pearls), China is today its largest producer with 1,000 tonnes in 2007, of which 650 tonnes reached the retail jewellery market (Fiske and Shepherd 2007). Despite this success, quantifying freshwater pearl production in China is difficult, mostly because of the vast extent of the territory and the hundreds of individual pearl farms in certain areas (Fiske and Shepherd 2007). The species of freshwater bivalves initially used for pearl production belong to the family Unionidae, which includes the mussels named “karasu” *Cristaria plicata* (before 1990) and “ikecho” *Hyroipsis cumingi* (after 1990), the latter producing pearls of larger sizes (3–10 mm) and a variety of shapes, colors, and luster.

Like China, Mexico has different species of freshwater mussels, which apart from being locally consumed, may be used for producing “mabes” (half-pearls) or “keshies” (baroque pearls lacking a round grafted bead or saibo), as well as other add-on value products obtained from the shell and nacre. In Mexico’s southern State of Tabasco, there are numerous lagoons, lakes, and ponds of many sizes (Fig. 1) that have abundant shellfish populations, according to reports from local fishermen, but all of them are completely underutilized. This regional situation offers a great opportunity for development of aquaculture projects intended to create pilot-scale pearl farms as a model of social and economic development in rural communities, where fishermen and their families can engage in cultivating freshwater bivalves (clams) to obtain employment and economic benefits. Despite this potential, we still lack basic information concerning:

1) the number, location, and character of water bodies that are suitable for a project of this nature; 2) information on the abundance and distribution of each of the freshwater bivalves in these water bodies; 3) biological information on growth rates, reproductive seasonality, quality of the nacre layer, resistance to manipulation (grafting of beads); and 4) other aspects related to commercial production of freshwater pearls. Obtaining this information in the near future has become of great interest for government agencies in the State of Tabasco.

Based on the above, the Ministry of Forest and Fishery Development of the Government of Tabasco (Secretaría de Desarrollo Agropecuario Forestal y Pesca or SEDAFOP), the Fundación Produce Tabasco (FPT, Mexico), and the Centro de Investigaciones Biológicas del Noroeste (CIBNOR) in La Paz, Baja California Sur, Mexico started a project to evaluate the potential use of freshwater clams in Tabasco for producing pearls and add-on value products derived from the shell and nacre. For this purpose, key information was collected from several lagoons and water bodies in the northern, central, and southern area of Tabasco from March through September 2011, including: 1) satellite position and size of the selected water bodies; 2) physical and chemical parameters of the water, such as temperature, salinity, dissolved oxygen, pH, suspended and dissolved particulates, transparency, and average depth; and 3) biological characteristics of the species (shell height, length, and width, total wet weight, distribution, abundance, number of live and dead specimens). We are also evaluating information concerning quality of the nacre layer and resistance to manipulation. So far, we have sampled 23 water bodies and identified 7 species of freshwater bivalves: *Lampsilis tampicoensis*, *Margaritifera auricularia*, *Potamilus* sp. (Unionidae), *Rangia cuneata* (Mactridae), *Polymesoda arctata* (Corbiculidae), *Megapitaria* sp. (Veneridae) and *Ischadium recurvum* (Mytilidae) (Fig. 2). *L. tampicoensis* is present in 50% of the lagoons, *R. cuneata* and *Potamilus* sp. in 42%, *P. arctata* in 33%, *Megapitaria* sp. in 25%, and *M. auricularia* and *I. tampicoensis* in 8%. Regardless of the composition of any of the water bodies, the most abundant species were, in decreasing order, *R. cuneata*, *L. tampicoensis* and *Potamilus* sp.

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Figure 1. The State of Tabasco in the southeastern part of Mexico and the locations where lagoons and water bodies were sampled for freshwater bivalves (marked with red dots).

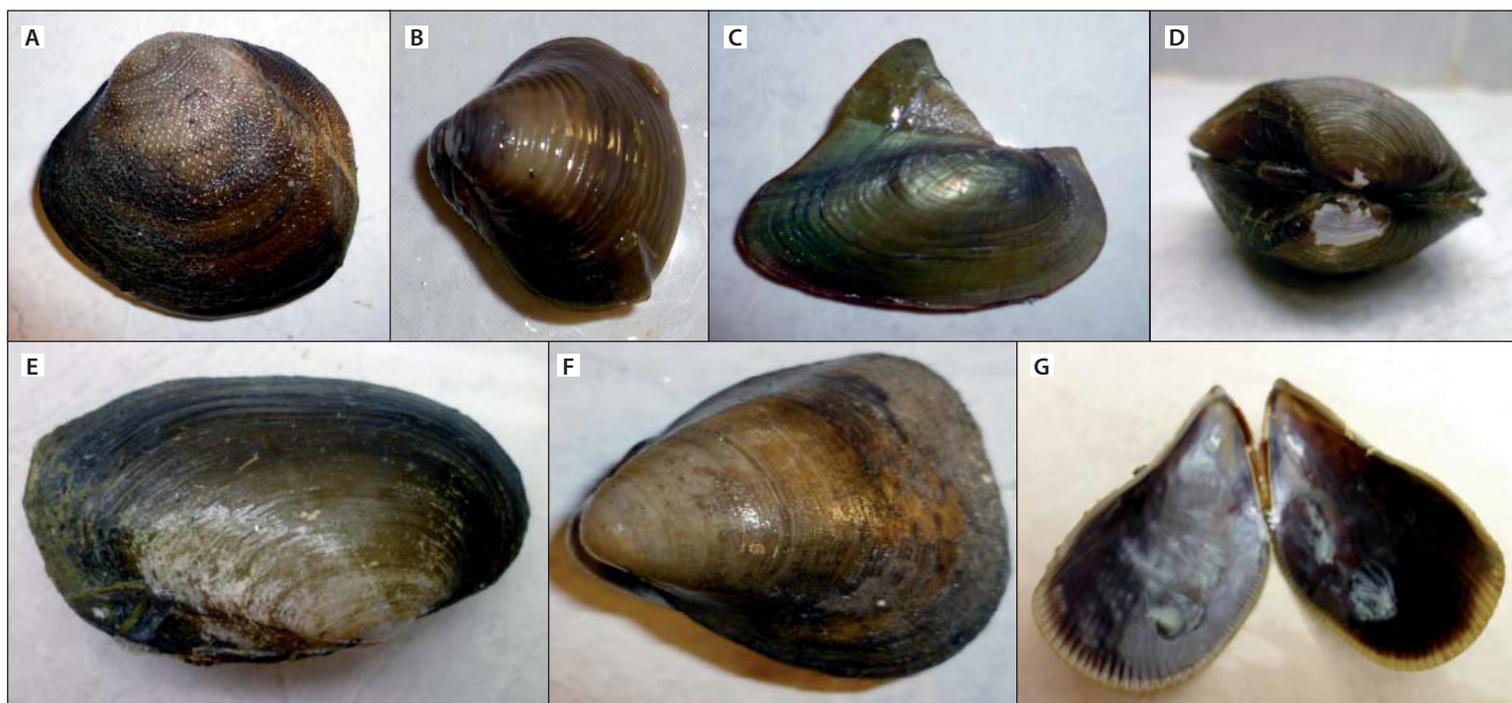


Figure 2. Species of freshwater bivalves identified in samples from water bodies in the State of Tabasco, Mexico. (Photo: Manuel Carranza)
 A: *Lampsilis tampicoensis*; B: *Rangia cuneata*; C: *Potamilus* sp.; D: *Polymesoda arctata*;
 E: *Margaritifera auricularia*; F: *Megapitaria* sp.; G: *Ischadium recurvum*

We are currently deciding which species and localities will support the project during its second phase in 2012. Once analysed with SEDAFOP authorities, workers will be trained in techniques to induce formation of half and keshi pearls, as well as making crafts and add-on value products from the shell and nacre, such as earrings and necklaces. After training the staff, the goal is to transfer these artisanal skills to fishermen and families in some rural communities to create one to three pilot-scale pearl farms that offer livelihood opportunities to the local population. Based on these results, the next objective is to support the project during 2013, but increasing the number of demonstration pearl farms and scaling production from pilot-scale to a pre-commercial level, involving several communities in Tabasco. The final goal is to promote continuous social and economical development based on truly sustainable aquaculture practices.

Acknowledgements

The information for this manuscript is part of the project "Alternativas de aprovechamiento de almejas dulceacuícolas en el estado de Tabasco", granted by the Fundación Produce Tabasco (FPT). We wish to thank Francisco Gurza-Merino (general manager of FPT) and Ignacio Lastra-Marin and Carlos

García-Bojalil (heads of SEDAFOP-Villahermosa) for their support for approval and execution of this project. The authors are also grateful to Manuel Mendoza-Carranza at El Colegio de la Frontera Sur for assistance in sampling the water bodies in Tabasco, Alfonso Alvarez at Universidad Juárez Autónoma de Tabasco for help in evaluating biological features of freshwater clams, and Ira Fogel for improving the English version of this manuscript.

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