

## Large-scale sandfish (*Holothuria scabra*) aquaculture in multitrophic polyculture ponds in southern China

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### Abstract

The sea cucumber “sandfish” (*Holothuria scabra*) is now produced in southern China within multitrophic polyculture ponds (>300 ha) with pearl oysters and groupers. Starting stocking densities are 2–3 ind. m<sup>-2</sup>, and final densities at harvest are in the range of 95–320 g m<sup>-2</sup> of sandfish in the ponds. Current production is over 1 million market sized animals annually. China is outpacing Indo-Pacific island countries in the commercial application of mariculture technology for culturing sandfish.

### Introduction

Mariculture of the high-value sea cucumber sandfish, *Holothuria scabra* Jaeger 1833, has been possible for more than a decade owing to the development of hatchery and grow-out technology (e.g. Pitt 2001; Agudo 2006). Commercial-scale aquaculture is occurring in countries such as Madagascar, Vietnam, Maldives and Saudi Arabia (Purcell et al. 2012), and has recently taken off in southern China. Apart from relatively small-scale production in New Caledonia, and recent community-based ranching in Papua New Guinea (Hair et al. 2016), there has been very little uptake of hatchery and grow-out technology in other Pacific Island countries.

In China, sandfish is called *ming yu shen* (明玉参), or “rough sea cucumber” (*cao hai shen*, 糙海), and is naturally occurring in China’s tropical waters of southern Guangdong Province. Since around 2010, sandfish have been cultured in Xuwen County, near Zhanjiang City, on the western coast of Guangdong Province (approx. 20°15’N, 110°13’E).

### Commercial production

Sandfish are grown-out in earthen seawater ponds (Fig. 1) on three farms, comprising more than 300 ha in surface area (5,000 mǔ = 307 ha).<sup>3</sup> Many of the ponds were previously used for shrimp culture, but were abandoned due to problems with heat stress in the ponds.

The large ponds in Xuwen County are being used to grow sea cucumbers in a three-dimensional polyculture with *Akoya* pearl oysters for mabé

pearls (*Pinctada martensii* [Dunker]) and groupers (*Epinephelus* sp.). In 2015, approximately 4 million juveniles were produced for grow-out. The starting stocking density for grow-out is about 2–3 ind. m<sup>-2</sup>. From these juveniles, 1–2 million commercial sized animals were reportedly harvested, with body lengths averaging about 20 cm and body weights ranging 300 to 500 g per piece fresh (Fig. 2). These values of production equate to



**Figure 1.** An earthen pond used to culture sandfish, pearl oysters and groupers. Pearl oysters are suspended on lines from plastic bottles floating on the surface.

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<sup>3</sup> A mǔ is a Chinese unit of area equivalent to 614.4 m<sup>2</sup>



**Figure 2.** Fresh sandfish harvested from polyculture ponds in southern China.

final grow-out densities (at harvest) in the range of 95–320 g m<sup>-2</sup> of sandfish in the ponds, which is commensurate with grow-out densities of sandfish in earthen ponds from other regions in the world (Purcell et al. 2012).

### Conclusions

The mariculture proponent believes that the three-dimensional culture of pearls, sea cucumbers and fish in the ponds allow for better recycling of aquaculture feeds and waste products. Production volumes have increased dramatically in recent years through the testing of suitable stocking densities and pond maintenance strategies for the polyculture. Although much of the early development of hatchery technology for sandfish was developed by WorldFish in Solomon Islands and New Caledonia, other countries such as China are taking a lead with the large-scale commercial application of that technology.

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