

## Review

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# The seaweed resources of Malaysia

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**Abstract:** The extensive coastline and numerous islands of Malaysia provide various habitats suitable for the growth of a diversity of the marine macroalgae (seaweeds). Since the last checklist of the Malaysian seaweeds was published in 2006, there has been an increase of 17 families, 32 genera, and 75 species. Seven new species were described. The present tally stands at 459 taxa in 72 families; with 35 species in 12 families of Cyanophyta; 113 species in 16 families of Chlorophyta; 95 species in 8 families of Ochrophyta; and 216 species in 36 families of Rhodophyta. Only three species, *Kappaphycus alvarezii*, *Eucheuma denticulatum* and *Gracilaria manilaensis*, are being cultivated commercially. A small seaweed industry centered in Sabah, produces semi-refined carrageenan, which is mainly exported. Some of the biomass is brought over to Peninsular Malaysia, where seaweed products like desserts, health drinks, soaps and air-fresheners, are manufactured and sold. In 2016, Malaysia produced 205,989 tonnes wet weight seaweeds valued at US\$24.83 million. The seaweed industry, can be enhanced by increasing the number of farms and farmers, strengthening local seaweed cooperatives and including them in decision-making, as well as by technological advances in the form of new and improved strains, more efficient seed supply and products.

**Keywords:** checklist; cultivation; industry; seaweed resources.

## Introduction

Malaysia, stretching from 1 to 7°N, comprises Peninsular Malaysia, and East Malaysia which is made up of the states of Sabah and Sarawak that form part of the large Borneo Island. Malaysia has an extensive coastline

totaling 3432 km, with 418,000 km<sup>2</sup> of continental shelf (Phang 1998). Numerous islands fringed by coral reefs form clusters along the coastlines, while mangroves dominate the west coast of Peninsular Malaysia due to the discharge from the many rivers and the sheltered conditions due to the close proximity to Sumatra. Rocky shores based on out-crops of post Triassic granitic rock occur along the west coast states of Perak and Melaka and the northern part of the east coast of Peninsular Malaysia, while the southern shores are based on Triassic quartzite and shale. In general, the shores of the east coast Peninsular Malaysia and East Malaysia are sandy, with the more pristine reefs occurring on the east coast of Sabah. Malaysia's equatorial climate is dominated by monsoon wind systems, with the Northeast Monsoon blowing between November and March, while the Southwest Monsoon brings rain from May to September (Phang 1998). The salinity of Malaysian waters ranges between 28 and 34 (Guest et al. 2012, Daryabor et al. 2016), while surface water temperature ranges between 25.0 and 30.5°C (Daryabor et al. 2014). Semi-diurnal tides occur on the west coast Peninsular Malaysia, while the east coast has a mixed tidal system. Mixed tidal regimes occur in Sabah and Sarawak (Phang 2006).

## Seaweed flora of Malaysia

The list of seaweeds in Malaysia has increased greatly since the last checklist published (Phang 2006). This is due to the increase in algal taxonomists in the country, regional collaborations and the efficient use of molecular tools that enabled finer distinction between morphologically similar taxa (Phang 2018). Checklists of Malaysian seaweed flora were published by Phang and Wee (1991), Phang (1998) and Phang (2006). A list of marine algae in the South China Sea bordered by Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam was also published (Phang et al. 2016). The regional checklist included 1442 species including subspecies and varieties in 96 families; with 119 species in 12 families for Cyanophyta, 305 species in 22 families for Chlorophyta, 258 species in 14 families for Ochrophyta and 730 species in 48 families for Rhodophyta. Analysis based on the

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