



Development of phycology in Malaysia

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Received: 22 January 2018 / Revised and accepted: 20 March 2018 / Published online: 16 April 2018

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Abstract

Phycological research in Malaysia started in the 1900s with the documentation of both freshwater and marine microalgae and seaweeds, especially those with economic importance. Phycological research has grown and matured from initial diversity and ecological studies to DNA-based research which allowed us to venture into the world of algal biotechnology with focus on phylogenetics, genomics and strain improvement. Our research has expanded towards finding solutions to the declining food and fuel resources to be relevant in today's world of energy and food crises amidst a changing climate. Sustainability solutions are especially relevant and will continue to drive the development of our seaweed industry and the opportunities for establishment of an algal industry in Malaysia. Algal farming offers many opportunities for research and development activities, and great potential, especially due to the abundant tropical sunshine, long coastline, good infrastructure and global connectivities. This paper is a brief account of the development of phycology in Malaysia, followed by some thoughts on future directions. Our research is supported by two very important collections: (i) the University of Malaya Algae Culture Collection (UMMAC) and (ii) the University of Malaya Seaweeds and Seagrasses Herbarium.

Keywords Algae biotechnology · Malaysia · Limitation · Sustainable solutions · Priorities

Introduction

Phycological research in Malaysia and the surrounding Southeast Asian countries has contributed significantly to the development of Phycology in the tropics. The study of algae and seaweeds was initiated by British scientists in the 1930s, who came to this British colony as fisheries scientists, agriculturists and teachers in the universities and colleges. The earliest publications on algae contributed checklists and focussed on the discovery of algal resources and their uses. Of these, the most productive were Ruth Patrick (1936), G.A. Prowse (1957, 1958, 1959, 1960, 1962a, b, c, 1969) and S. Kumano (1978), who collected and published the freshwater algae from lakes (Prowse and Ratnasabapathy 1970), rice fields (Johnson 1970) and rivers (Ratnasabapathy 1972). Kumano worked closely with M. Ratnasabapathy and others and produced an impressive list of at least nine new species

and new records of the freshwater red algae, specifically of the Batrachospermaceae (Kumano and Ratnasabapathy 1982; Ratnasabapathy and Kumano 1982a, b; Kumano and Phang 1987, 1990; Anton et al. 1999). Recently, Morgan Vis and her team described a new species of *Batrachospermum phangii* ET Johnson, PE Lim & ML Vis (Johnson et al. 2014). These pioneers worked closely with the Malaysian scientists until the first milestone was reached in the 1980s, with Malaysian phycologists being established in the local universities. Further checklists of freshwater algae followed (Wah et al. 1987; Phang and Leong 1987; Yusoff et al. 1985, 1998; Wan Maznah 1999; Sato and Anton 2000). The marine algae or seaweeds were earlier appreciated for their many uses in the 1950s and 1960s, especially as sources of food, medicine and other economic products (Zaneveld 1951, 1959; Burkill 1966). Checklists and discoveries of new species and new records of marine algae followed with M. Masuda and his joint expeditions with SM Phang, sponsored by a Monbusho grant from Japan, took place from 1997 to 2003 (Masuda et al. 1999, 2000a, b, 2001a, b, 2002, 2003; Terada et al. 2000; Kawaguchi et al. 2002; Yamagishi et al. 2003; Tani et al. 2003). This resulted in the expansion of the University of Malaya Seaweed and Seagrass Herbarium and the training

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