MICROALGAE BIOMASS AS BIOFERTILISER

Wan Nur Aisyah Wan Osman, Shafirah Samsuri

Nomenclature

CAGR	Compound Annual Growth Rate
DNA	Deoxyribonucleic Acid
MBF	Microalgae Bacterial Flocs
MB	Microalgae Biomass
MBB	Microalgae Based Biofertiliser
RNA	Ribonucleic Acid

INTRODUCTION

Waste, especially biomass, contains a huge reservoir of nutrients that could be recovered through various technologies and used to produce another new and valuable product. Biomass from microalgae sources is known as promising feedstock, which is useful in many applications such as the production of biofertilisers [1]-[4], biofuels [5], biochar [6], health supplements [7], food and animal feed [8]-[9]. Microalgae biomass (MB) has a wide range of possible uses because it has numerous species and is rich in carbohydrates,

lipids, proteins, pigments, and vitamins [10]. To date, Suganya et al. [11] reported that approximately around 800,000 species of microalgae exist. The most produced microalgae species in the global range are Arthrospira, Chlorella, Dunaliella, Nostoc and Aphanizomenon. In contrast, the common species used commercially are Isochrysis, Chaetoceros, Chlorella, Arthrospira and Dunaliella [12] and among them, the most dominating species are Chlorella and Arthrospira [13]. Microalgae can be classified mainly due to their pigmentation, cell structure and life cycle [14]. They are considered microscopic and unicellular organisms due to their small size in the range of 1 to 900 μm [15]-[16]. In contrast with macroalgae, macroalgae are known as macroscopic and multicellular organisms with a larger size (maximum length can reach 65 m) compared to microalgae [14].

As mentioned earlier, MB showed potential in various applications, and currently, the use of MB as a biofertiliser has gained interest in agricultural industries aiming to improve the sustainability of crop production as it contains a large number of macronutrients and micronutrients which are essential for crop growth and development [17]-[18]. Coppens et al. [19] proved that MB has a high potential to produce a more sustainable and resource-efficient agricultural production system as it efficiently recovers nutrients from waste streams and is effective as a sustainable slow-release fertiliser. It is well-known that the cost of producing microalgae is relatively expensive, especially during the cultivation stage; hence, the application of MB as an application of low-cost resources for nutrient-rich wastewater, agricultural by-products and inexpensive fertilisers is an effective alternative to increase the cost-effectiveness of microalgae production [20]-[21]. In light of this point, this chapter highlights the advantages of MB as biofertilisers for crop production such as improving the quality of the product, increasing the adsorption capacity of phosphorus by plants as well as environmental issue mitigation. On the other hand, this chapter also discussed the application of MB as a biofertiliser in the agricultural industry, such as in the production and harvesting of food crops and substitution for chemical fertilisers. Lastly, this chapter explained the global microalgae market and the challenges that must be overcome.