**Physical and mechanical properties of biodegradable films developed from alginate extract of wild seaweed Padina sp.**


## ABSTRACT

Seaweeds, an abundant biomass, have shown potential as base material for the production of biodegradable plastics. Compared to plant-based biomass such as starch, seaweed has short harvest time and does not compete for land-use to grow. Most of the studies on seaweed-based bioplastics were using carrageenan extract from Kappaphycus sp. and alginate from Sargassum sp. In this study, film sheets from crude alginate extract from a less-explored brown seaweed Padina sp. (PA) were developed by using glycerol (1%, 2%, and 3%, v/v) as plasticizer agent. The alginate extraction was using acid and alkali solutions. For comparison, films were also developed using commercial alginate (CA). The physical and mechanical properties, and biodegradability of these films were analysed using standard methods. As results, the PA film sheets were 0.029 to 0.052 mm in thickness with moisture content of 31 – 35 %. The tensile strength (TS) were 0.7 - 1.9 MPa where it decreases with the increase of glycerol. Meanwhile, the elasticity (elongation-at-break, EAB) is on the opposite trend i.e. 3% glycerol is more elastic than 1% and 2%. Similar trends were observed in CA but with higher TS. As for barrier property (expressed as water vapour permeability, WVP), there is no significant different in all the films. In term of appearance, the higher glycerol content gave better opacity and colour difference to the films. Interestingly, PA films has better opacity and colour difference compared to CA films. On biodegradability, all the PA films completely degraded in 15 days whereas CA films took 18 days. These results showed that Padina sp. has a good potential as base material for biodegradable films, however, TS and WVP of the resulted films need to be improved further. This can be done with reinforcing manipulation using cross-linker such as cellulose.