

## Chapter 2

# Alginate Production from Marine Macroalgae, with Emphasis on Kelp Farming

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**Abstract** Alginates are produced industrially from marine macroalgae (also called seaweeds) belonging to the taxonomic group of brown algae (phylum Ochrophyta, class Phaeophyceae). In particular, the seaweeds commonly known as kelps (order Laminariales) are the most widely exploited worldwide as raw materials for alginate production. Alginophytes (i.e. alginate-yielding seaweeds) are mainly harvested from wild populations, although some of the raw material that is used in the alginate industry comes from the cultivation of the kelp *Saccharina japonica*. The demand for alginate production has increased over time, and it is likely to increase significantly in the future, particularly for the use of alginates in current and future biomedical and bioengineering applications. However, alginophyte resources are limited, and the natural kelp resources have declined worldwide in recent years. One way to meet the current and future demands of alginate-using industries is to encourage alginate production via kelp farming. The mariculture of the kelp *S. japonica* has already been well developed in Asia, and the cultivation of other kelp species is currently also being attempted in Europe and the Americas. This chapter provides an overview of seaweeds as a feedstock for alginate production, with emphasis on kelp farming to ensure a sustainable supply of alginates required for many applications. It describes the major stages for the cultivation of *Saccharina* and any other kelp, as well as the economic and environmental benefits of integrated kelp aquaculture to produce alginates, in addition to other value-added products.

**Keywords** Alginate extraction • Alginate production • Alginophytes • Aquaculture • Brown seaweeds • Kelp farming • Marine macroalgae • Seaweed alginate • Seaweed resources

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