Nutritional value and heavy metal content of farmed and candidate aquaculture seaweed species in South Africa

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In South Africa, seaweed aquaculture is presently limited to *Ulva lacinulata* and *Gracilaria gracilis*, which are used as feed for farmed abalone (*Haliotis midae*) and, in the case of the former, also for water bioremediation in integrated aquaculture systems. *Laminaria pallida*, *Ecklonia maxima* and *Macrocystis pyrifera* are additionally considered potential candidates for commercial kelp aquaculture. The present study aimed at analysing the nutritional value and heavy metal content of these species to assess their beneficial value for human consumption and for animal feeds. *Ulva lacinulata* and *G. gracilis* were sampled at an abalone farm and kelps were collected from natural stocks. All seaweeds contained similar levels of lipids (~3% dry matter-DM) and carbohydrates (~14% DM), while *U. lacinulata* and *G. gracilis* had a higher protein content (28% and 20% DM, respectively) than kelps (~14% DM). Both farmed species also contained higher levels of polyunsaturated fatty acids, with ω-6 and ω-3 being highest in *U. lacinulata* and *G. gracilis*, respectively. In terms of macrominerals, the highest levels of Ca, K and Mg were found in *U. lacinulata*, *M. pyrifera* and *G. gracilis*, respectively, while all kelps showed higher levels of Na and P than *U. lacinulata* and *G. gracilis*. Regarding trace elements, all seaweeds showed similar levels of Zn, while the farmed seaweed species contained higher Fe, Se, Cu, Mn and Cr levels than the kelps. For heavy metals, *U. lacinulata* and *G. gracilis* accumulated higher Al and Pb levels than kelps, whereas the opposite was found for Cd, Hg and As. *Laminaria pallida* and *E. maxima* also contained the highest levels of I. In conclusion, the studied seaweed species showed significant species-specific variations in their nutritional value and were particularly rich in minerals. Results will be discussed in relation to Recommended Nutrient Intake and known maximum limits for heavy metals.

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