Antigenotoxic and longevity-promoting potential of red seaweeds *Porphyra umbilicalis* and *Grateloupia turuturu* in *Drosophila melanogaster*

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Seaweeds have been increasingly explored for human food industry and, in particular, red seaweeds *Porphyra umbilicalis* and *Grateloupia turuturu* are often included in the diet (mainly in East Asia), displaying a rich chemical composition and beneficial effects. Nevertheless, there are knowledge gaps in studies focusing their potential to protect genome integrity, a critical premise for disease prevention and longevity-promotion. In line, *in vivo* studies assessing the effects of the full intake of these algae are lacking. Thus, *Drosophila melanogaster* diet was supplemented with *P. umbilicalis* and *G. turuturu* aiming the evaluation of their potential as genome integrity- and longevity-promoters, using somatic mutation and recombination test (SMART) and longevity assay, respectively. For longevity assay, seaweeds were incorporated in the media at 1.25, 2.5, 5, 10 and 20% (w/w). Alga supplementation occurred until eclosion. Flies were counted weekly until death. For SMART, the diet was supplemented with 5 and 10% *P. umbilicalis* and 10 and 20% *G. turuturu* until eye observation in adults. A DNA damage inducer, streptonigrin (SN), was added as genotoxic insult. Eye observation consisted in counting the total number of spots per eye, *i.e.*, white phenotype ommatidia in red eyes. Supplementations with 10% *P. umbilicalis* and 20% *G. turuturu* were able to promote an increase of the longevity of *D. melanogaster*, with *G. turuturu* reaching the highest potential; there were no significant differences between males and females longevity. The spontaneous genotoxicity (without SN-challenge) was reduced in flies supplemented with 10% *P. umbilicalis* and 10 and 20% *G. turuturu*. On the other hand, all seaweed concentrations demonstrated antigenotoxic potential against SN-induced genotoxicity. The major promoter of genome integrity was 20% *G. turuturu* and 5% *P. umbilicalis* the lowermost. Furthermore, SN demonstrated its genotoxic capacity, depicted in the increased number of spots comparatively to unchallenged flies. Considering the seaweed supplementation level of 10% for SN-challenged conditions, a higher antigenotoxic potential was displayed by *G. turuturu*. Within the framework of nutrition-toxicology, the tested seaweeds proved to be promoters of a safe and healthy nutrition as functional foods.