

***Nannochloropsis oceanica* as a new natural source of vitamin D₃**

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Abstract:

There is a growing awareness about vitamin D as a requirement for optimal human health. Vitamin D₃ is responsible for maintenance of calcium homeostasis in vertebrates and it can be either synthesized by a photochemical conversion of provitamin D₃ in the skin or acquired through the food. However, very few food sources naturally contain vitamin D₃, which may result in deficiency, especially for vegan consumers since vitamin D₃ mainly exist in the animal kingdom. Fish have the highest natural content of vitamin D₃, for which is suggested that originates from microalgae. However there are no studies reporting which microalgae species may be the source of this vitamin.

In this study four selected microalgae species, *Chlorella minutissima*, *Nannochloropsis oceanica*, *Arthrospira maxima* and *Rhodomonas salina* were grown and exposed to UVB rays under different conditions (duration of exposure, distance from the light source). Growth was characterized in cultures with and without UVB exposure. For investigating the effect of UVB rays on the biochemical composition of the cells, vitamin D₃, total lipids, fatty acid composition, pigments and tocopherols were determined.

N. oceanica was able to produce vitamin D₃ and production was significantly enhanced by increasing the duration of the UVB exposure and decreasing the distance from the light source (up to 1413 ± 242 ng/g dry biomass). None of the other tested species were able to produce vitamin D₃. The total lipid content significantly increased with the time of the UVB exposure, while the content of polyunsaturated fatty acids, chlorophylls and tocopherols decreased. These findings suggest that microalgae species with a high natural amount of vitamin D₃ may be used as a natural form in food or feed fortification.

Keywords:

vitamin D₃, UVB light, fatty acids, pigments