

## **Characterization of *Chlorella vulgaris* Cultivated with Different Medium Through FTIR and CHNS Analysis**

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### **Structured Abstract**

**Background:** Cultivating microalgae on an industrial scale requires a significant amount of mineral fertiliser and the manufacture requires energy and fossil fuels, making it an unsustainable practice over time. On contrary, organic fertiliser is rich in nutrients that promote microalgae development. As part of this study, plant-based and animal-based compost are used to see how *Chlorella vulgaris* grows with a specific emphasis on the nutrient medium used. The goal of this study are to grow microalgae using nutrients from plant- and animal-based compost and to characterize microalgae using FTIR, CHNS and lipid extraction.

**Methods:** *Chlorella vulgaris* are grown in a 5L photobioreactor using continuous fluorescent lighting with 50 mL of plant-based or animal-based compost to promote nutrient for microalgae. The cultivation is carried out for 16 days. The pH of the culture media is determined daily using a pH meter, which can be modified with HCl or NaOH. The optical density of *Chlorella vulgaris* is measured using a UV spectrophotometer and the biomass weight is obtained by drying process. The microalgae are evaluated using an CHNS, FTIR and lipid extraction.

**Results:** Cultivation of *Chlorella vulgaris* with plant-based compost showed a better growth by recorded a high yield with 0.86 g/L and specific growth rate of 0.140 day<sup>-1</sup> compared to animal-based compost with a yield of 0.65 g/L and specific growth rate of 0.161 day<sup>-1</sup>. The characterization of microalgae with CHNS showed the percentages content in the dried biomasses for cultivation with plant-based and animal-based compost. FTIR spectra illustrated the presence of an alcohol, alkene and carbonyl groups. Plant-based compost yields a lipid value of 19.39% for microalgae cultivation compared to only 11.77% for animal-based lipid content in algae biomass.

**Conclusion:** In brief, *Chlorella vulgaris* cultivated with plant-based compost showed better results compared to when cultivated with animal-based compost both in the growth and the characterization of the biomasses.

**Keywords:** Cultivation, *Chlorella vulgaris*, plant-based compost, animal-based compost

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