Effect of Humic Acids from Biomass Biostimulant on Microalgae Growth †

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Abstract: Humic substances (HSs) are formed by chemical and biological transformations of vegetal
and animal biomass through microbial metabolism, representing a major organic carbon source at the
soil’s surface. They contribute to the adjustment of many major ecological processes. For example,
HSs enhance plant growth and terrestrial life in general, adjust carbon and nitrogen cycles in the soil,
enhance plant and microorganism growth, improve the fate and transportation of anthropogenic
compounds and heavy metals and stabilize the soil [1,2]. Scientists define humic acids (HAs) as humic
materials that are soluble in aqueous alkaline solutions and that precipitate when the pH is brought
to 1–2 [3]. For lignin extraction from BSG, various DESs were used. Humification of the extracted
lignin was carried out through a reaction with hydrogen peroxide in the presence of ferric sulphate
heptahydrate. Biostimulant tests were conducted at 25 ± 2 °C, illuminating with a fluorescent light
lamp at 100 µmol/m²·s (µEinstein), with a light/darkness period of 14/10 h for 9 days up to 2 weeks.
Parameters such as turbidity, optic density and chlorophyll content were studied. Concentrations of
10 mg/L and 1 mg/L in the case of reference products BJK and LSNa and of 1 mg/L in the case of the
obtained HAs were used. Lignin was extracted with various yields. HAs were identified using FT-IR
spectra. HAs derived from lignin had the best biostimulant activity in the period of 9 days for the
0.1 mg/L concentration. The biostimulant effect of various HAs showed promising results in every
case, and the HAs obtained from lignin had a better effect than the commercial product containing
HAs after 9 days.

Keywords: humic acids; lignin; microalgae; biostimulant effect

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