

# Application of *Scenedesmus obliquus* in the treatment of a real wastewater

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In the present study, the microalga *S. obliquus* CCAP 276/38 has been applied in the treatment of a real wastewater derived from an anaerobic digestion process of corn silage and livestock wastewater. The liquid phase of the digestate showed a low viscosity value and a high content of ammonia. Up to 3 g/l In a preliminary phase, the experimental tests were carried out in Erlenmeyer flasks in order to identify the optimal digestate concentration and, in particular, its influence on biomass growth and productivity.

The tests were carried out at 20°C, initial pH value of about 8.7 and at an artificial dark/light cycles of 12 hours. Three different concentration of digestate were tested: 1, 2 and 3% in water, in presence of sodium bicarbonate ( $\text{NaHCO}_3$ , 50 mM) as inorganic carbon source.

The obtained results showed that *S. obliquus* was able to grow in all the tested digestate concentrations even if a higher growth rate and biomass production were observed in the cultures containing 1% wastewater. In order to test the influence of N/P ratio on microalgae growth, two different salts,  $\text{KNO}_3$  (0,2 g/l) and  $\text{K}_2\text{HPO}_4$  (0,02 g/l), were added to the medium containing 1% digestate (N/P  $\approx$  80), to correct the N/P value. The biomass growth rate increased in the medium with the lower N/P value.

The microalgae production process was scaled-up in a stirred tank bioreactor (working volume 5l), in controlled conditions of temperature and illumination (i.e. 20°C and dark/light cycles of 12 hours) using a medium with the composition optimized in flask tests. The culture was carried out for 124 hours, fed-batch addition of digestate (1%) was done during the fermentation course in order to replace the carbon source. The results (growth rate, biomass dry weight and productivity) were compared with those obtained in presence of a synthetic medium with sodium bicarbonate as carbon source.

The work clearly demonstrated the capability of *S. obliquus* CCAP 276/38 to grow in alkaline wastewater and the possibility to employ this species in the treatment of effluents containing high ammonia concentration.