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## Centrate wastewater treatment with *Chlorella vulgaris*: simultaneous enhancement of nutrient removal, biomass and lipid production

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**Abstract:** Achieving high biomass and lipid yields simultaneously during the cultivation process is essential and currently represents one of the biggest challenges in the production of microalgal biofuel. Using waste streams for microalgal growth is essential to improving the economic viability of microalgal biofuel systems, and provides an avenue for wastewater treatment. In this study, the growth of and nutrient removals by *Chlorella vulgaris* (*C. vulgaris*) under autotrophic, heterotrophic, and mixotrophic conditions were optimized for centrate wastewater, generated from anaerobic digestion at wastewater treatment plants, as well as on glycerol, a byproduct from the downstream microalgal lipid transesterification process. Compared to autotrophic and heterotrophic conditions, mixotrophic conditions promoted more biomass growth ( $0.72\pm 0.01$  g/L) and yielded higher total chlorophyll ( $14.2\pm 0.1$  µg/ml) and carotenoid ( $12.9\pm 0.4$  µg/ml) concentrations. Subsequently, three glycerol feeding strategies (single-dose initial feeding, multiple-dose step feeding, single-dose exponential feeding) were studied under

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