

Flow Cytometry and Phytochemical Analysis of a Sunflower Cell Suspension Culture in a 5-L Bioreactor^s

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A cell suspension culture of sunflower (*Helianthus annuus*), a producer of immunologically active polysaccharides, was cultivated in a 5-L stirred tank bioreactor, operated in batch mode. After some changes in the internal bioreactor design a stable growth of *Helianthus* cells was achieved and the accumulated biomass reached 15.2 g/L (only ~5% lower compared to the accumulated biomass in shake-flasks). Flow cytometry used for measuring the cell cycle parameters of suspended *Helianthus* cells did not reveal significant differences between shake-flasks and bioreactor cultivation modes. For both cultivation methods significant enhancement of the percentage of S-phase cells was observed at the beginning of the cultivation process. Concerning the metabolite production the maximum in exopolysaccharides was reached at day 9 of the cultivation period (1.9 g/L), while the highest amounts of α -tocopherol were accumulated at the beginning of the cultivation process (day 2 of the cultivation). These findings were related to the respective stress levels caused by the inoculation procedure. The kinetic parameters of growth and polysaccharide production as well as the time course of carbon source utilization were monitored and discussed.

Key words: Cell Cycle, Exopolysaccharides, *Helianthus annuus*, Tocopherol