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BT-06

Biotransformations via de novo and ex novo pathways mediated by *Aspergillus niger* MYA 135: lipid accumulation from industrial residues

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Industrial residues such as crude glycerol (CG) and waste cooking oil (WCO) pose important ecological and economic problems. Thus, the synthesis of microbial lipids using biotransformation routes constitute an attractive alternative to employ those residues under the circular economy concept. It is known that oleaginous microorganisms are capable of utilizing both hydrophilic and hydrophobic substrates to accumulate lipids via de novo and ex novo, respectively. Besides, current problems of filamentous fungi fermentations and their further successful developments as microbial cell factories are dependent on control fungal morphology. In submerged fermentation, fungal morphology can vary from compact pellets to dispersed mycelia. Thus, the main objective of this work was to analyze biotransformations yielding lipids mediated by A. niger MYA 135 from CG (100 g/L) or WCO (25 g/L) in the presence of morphological effectors such as talc microparticles (8 g/L), FeCl3 (1 g/L) and MnCl2 (3.6 mg/L). Shake flask fermentation were conducted at 30ºC during 96 h with or without the supplementation of effectors according to a 23 factorial design. Under de novo lipid fermentation, lipid content was not significantly affected by fungal pelletization ($p=0.315$). The maximum lipid content was 32.38 ± 1.35 % of its defatted dry weight (w/w). However, the fatty acid (FA) profile obtaining from pellets (SFA: 19.57 %, PUFA: 36.43 %, MUFA: 44.00 %) was different to that obtaining form dispersed mycelium (SFA: 24.30 %, PUFA: 30.10 %, MUFA: 45.61 %). In addition, a significant interaction between FeCl3 and MnCl2 was detected ($p<0.001$). Under ex novo lipid fermentation, lipid content was significantly affected by the form of fungal growth ($p=0.010$). In this case, pelletization favored lipid accumulation. The maximum lipid content was 87.00 ± 1.41 % of its defatted dry weight (w/w). However, the FA profile obtaining from pellets (SFA: 22.01 %, PUFA: 19.92 %, MUFA: 58.07 %) was almost similar to that obtaining from dispersed mycelium (SFA: 21.19 %, PUFA: 22.82 %, MUFA: 55.99 %) and different to that observed from WCO (SFA: 12.11 %, PUFA: 48.32 %, MUFA: 38.31 %). In addition, the interaction between FeCl3 and MnCl2 was not significant ($p=0.092$). Thus, when the biotransformations swift from de novo to ex novo the FA profiles were changed toward synthesizing higher amounts of MUFA and lower amounts of PUFA.