

Supplementary Materials

***Cutaneotrichosporon oleaginosus*: a versatile whole-cell biocatalyst for the production of single cell oil from agro-industrial wastes**

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Table S1. Summary of the most common pretreatment approaches for lignocellulosic biomasses.

Pretreatment	Optimal conditions	Advantages	Disadvantages	Ref.
Dilute acid pretreatment	H ₂ SO ₄ , HCl, CH ₃ COOH 1-4 wt%, 50-60 °C, 30-120 min	High availability of catalyst, low consumption and cost of the catalyst, high efficiency of the catalyst	Corrosion of the reactor, downstream process for acidic streams, high environmental impact, difficult catalyst recycling, production of sugars-degradation by-products with an inhibitory effect on yeast growth, effect on the SCOs profile	[1-3]
Microwave irradiation	H ₂ SO ₄ 0.5 wt%, 135-190 °C, 2-20 min; 635-1400 W, 2450 MHz	Energy- and time-saving approach, versatile application in combination with others chemical, physical and biological processes	Low technology readiness level	[4-7]
Alkaline pretreatment	NaOH, KOH, Ca(OH) ₂ , 1-3 wt%, 30-60 °C, 6-24 h	High availability of catalyst, low consumption and cost of the catalyst, good efficacy, good lignin destructuration	Downstream process for basic streams, high environmental impact, difficult catalyst recycling	[8,9]
Steam explosion	160-260 °C, 5–50 atm, 2-10 min	Low environmental impact, very effective in biomass destructuration, high improvement of enzymatic digestability of treated solid residue, no catalyst need, very short process time	Energy-intensive process, production of sugars-degradation by-products with an inhibitory effect on yeast growth	[10,11]
Ionic liquid	[Bmim][Cl] + [Bmim][OAc], [Emim][OAc], [triethylammonium]), 5-10 wt%, 80–160 °C, 1-22 h	Versatile application in combination with other chemical and biological processes, low environmental impact, decrease in crystallinity of fibres, increase in biomass porosity, good improvement of enzymatic digestability of treated solid residue	High cost, difficult manipulation, negative effect on hydrolytic enzymes, difficult recycling	[12,13]
Organosolv	Acetone, ethanol; γ -valerolactone, 60-80 v/v%, 120-180 °C, 60-120 min	Low environmental impact if based on green solvent, no catalyst need, high delignification degree, high improvement of enzymatic digestibility of treated solid residue	Use of high volume of solvents, loss of a part of the hemicellulose fraction, downstream process for solvent recycling	[14-16]

Table S2. Summary of the main detoxification approaches used for the bioconversion of lignocellulosic hydrolysates.

Detoxification method	Advantages	Disadvantages	Ref.
Vacuum evaporation	Efficient for volatile compounds such as acetic acid, furfural and vanillin	Not effective in the removal of non-volatile compounds (e.g. extractives and lignin derivatives)	[10,17]
Membrane extraction	Effective for the reduction in the concentration of sulfuric acid, acetic acid, formic acid, levulinic acid, furfural and 5-HMF	Increase in the viscosity of the organic phase, energy-intensive process	[18]
Overliming with Ca(OH) ₂	Cost-effective method, effective for removal of organic acids	A slight loss of sugars (about 10 wt%) by adsorption on the precipitate	[19]
Activated carbon treatment	High adsorption capacity of inhibitory compounds, without affecting the sugars concentration	The effectiveness of activated carbon treatment is strongly related to various process variables such as pH, contact time, temperature and liquid to solid weight ratio	[20]
Ion-exchange resins	Greater specificity for organic and inorganic compounds	Expensive method	[21]
Ethyl acetate extraction	Effective removal of phenolic compounds	Not effective for hydrophilic compounds	[22]
<i>in situ</i> microbial detoxification	Cost-effective and more sustainable method than chemical-physical processes, low number of side reactions due to the great selectivity of microorganisms, energy-saving approach	Considerable consumption of fermentable sugars	[23]
Enzymatic purification	Effective removal of phenolic compounds, sustainable and energy-saving method, high selectivity	Low technology readiness level, high cost of enzymes	[24]

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