

CULTIVATION STRATEGY AS A TOOL TO MITIGATE THE NEGATIVE EFFECT OF LIGNOCELLULOSE DERIVED INHIBITORS

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Lignocellulose biomass is the most abundant renewable feedstock available for various biotechnological production of bulk chemicals, such as ethanol, butanol, acetone, isopropanol, and others. The main bottleneck of its extensive utilization lies in its recalcitrance and as a consequence need for processing under harsh conditions which generate a broad range of inhibitors. To reduce the amount of inhibitors, a milder but less effective process might be applied or a detoxification step can be introduced. Both attitudes increase the cost of the process and question the ecological merit of the utilization of lignocellulose. Here, we introduce a cultivation strategy based on sequential feeding that enables full fermentation of toxic substrate, which inhibits the growth of production strain *Clostridium beijerinckii* when used in the batch mode.

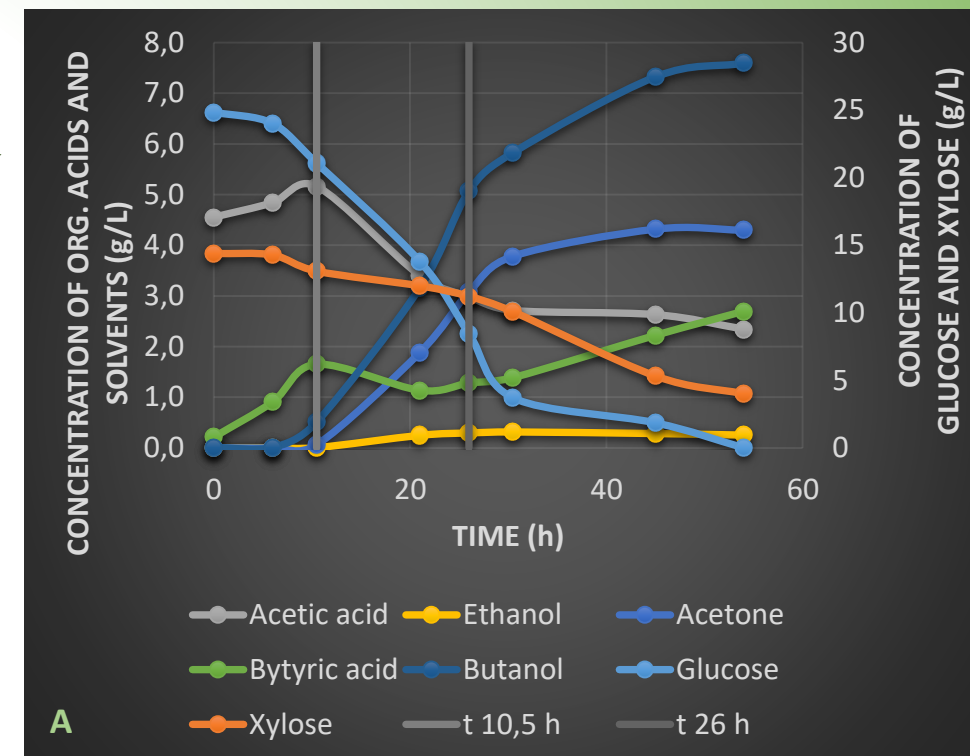
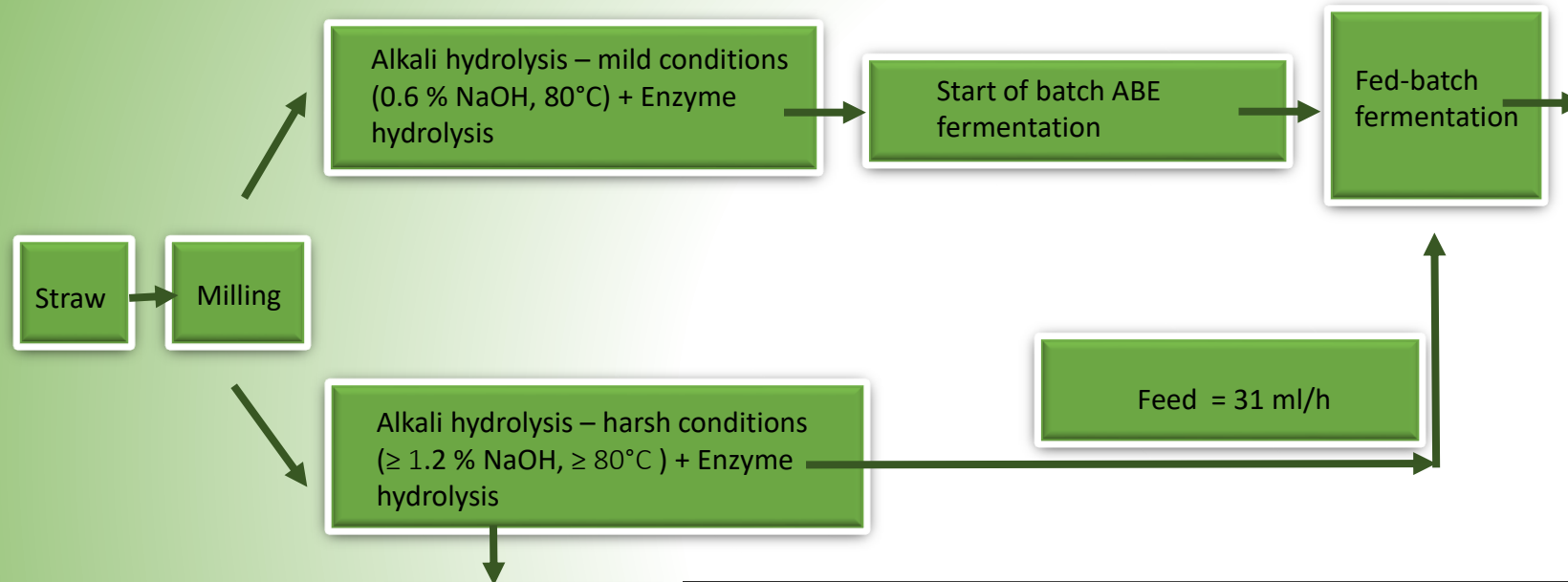


Figure A: Concentrations of glucose, xylose and metabolites during fed-batch cultivation; vertical lines indicate the start and end of the feeding. Medium with a high content of inhibitors prepared under harsh conditions was used as the feed.

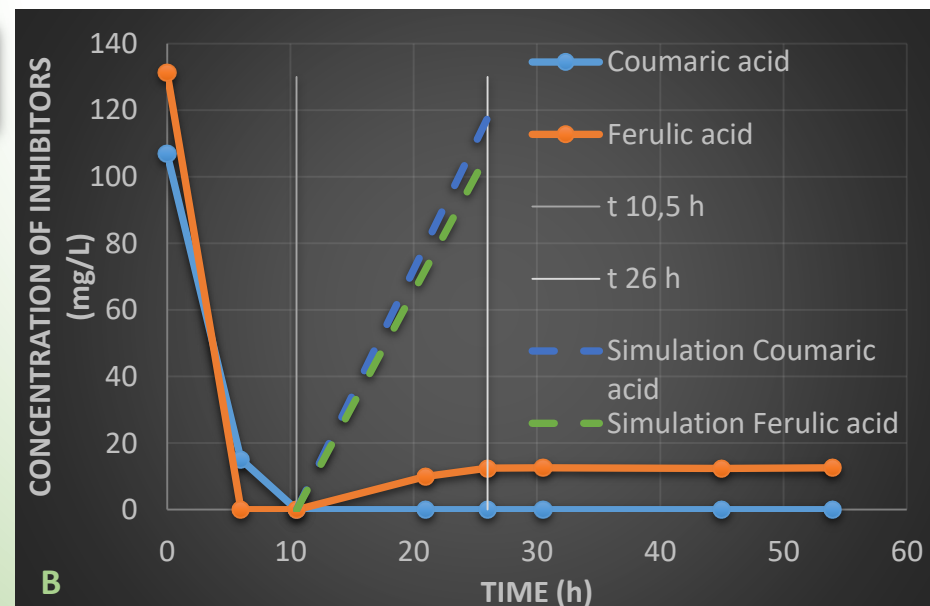


Figure B: Concentration of inhibitors during fed-batch cultivation; dashed lines indicate simulation of inhibitors concentration based on feed rate only.



Conclusion: Comparable solvents yields (0.3 g/g) and butanol concentration (7.6 g/L) were obtained as with complex rich laboratory medium without inhibitors. Moreover, up to 76 % xylose was consumed together with nearly 50 % of acetic acid generated during alkali pre-treatment.

Glucose consumption (%)	Xylose consumption (%)	Acetic acid decrease (%)	Y ABE	Y Butanol
100.0	76.4	47.3	0.31	0.19