

TITLE: STUDY OF THE CONVERSION OF FERULIC ACID TO 4-VINYLGUAIACOL BY *Klebsiella pneumoniae* TD4.7

AUTHORS: Maitê Bernardo Correia dos Santos; Mauricio Boscolo; Roberto da Silva; Eleni Gomes

INSTITUTION: Univerdade Estadual Paulista "Júlio de Mesquita Filho". (Rua Cristóvão Colombo, 2265 - Jardim Nazareth - São José do Rio Preto/SP - CEP 15054-000 - Brasil)

ABSTRACT: Aromatic compounds obtained from lignin degradation serves substrates for several chemical and biological transformation processes. These compounds serve as substrates for chemical and biological processes for obtaining various high added-value products. One of the aromatics compounds released during the deconstruction of lignocellulose is ferulic acid, whose biotransformation can result in the generation of important flavors products products such as vanillin, 4-vinylguaiacol. The biotransformation of ferulic acid may follow different pathways depending on the microorganism. The understanding of the metabolic pathway involved is fundamental for the purposal of a biotechnological process. Study of bioconversion of ferulic acid and indentification of the generated metabolites. The bacteria *Klebsiella pneumoniae* TD4.7 from work collection of Biochemical and Applied Microbiology laboratory, Unesp, São José do Rio Preto, SP, Brazil, was used in this experiment. Aliquots of 0.2 mL of suspension of bacteria pre-cultured with $DO_{600nm}=0.8$ was used for inoculate the fermentation medium mineral solution ferulic acid concentration of 300 mg L^{-1} and 500 mg L^{-1} of glucose, in 50 mL Erlenmeyer and incubated 48 hours at $30\text{ }^{\circ}\text{C}$, under shaking at 150 rpm. The microbial growth, glucose, ferulic acid and metabolites concentrations were evaluate. A synchronization between glucose and ferulic acid consumption and biomass production, in the first four hours of growth, was observed. 95 % of ferulic acid was dissipated from the medium after 20 h of cultivation. They were detected 4-vinylguaiacol, vanillin, vanillic acid and catechol in the culture media, which them were synchronized with the ferulic acid dissipation from the media. The maximum accumulation of 4-vinylguaiacol (76.7 mg L^{-1}) was reached after 32 hours of cultivation, as well as the reduction of ferulic acid by 290 mg L^{-1} , a yield of 0.5 mmol L^{-1} of 4-vinylguaiacol. Low concentrations of vanillin (2.31 mg L^{-1}), vanillic acid (3.29 mg L^{-1}) and catechol (2.15 mg L^{-1}). The bioconversion of *K. pneumoniae* TD 4.7 to ferulic acid observed in this work and the possibility of the use of alkaline hydrolyzed sugar cane bagasse as source of FA is a promising biotechnological process.

Keywords: ferulic acid; biotransformation; 4-vinylguaiacol