

Microbial and biochemical characterization of a bacterial consortium isolated from decaying wood by growth on a β -O-4 lignin-related dimeric compound

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Abstract

As an approach to evaluate the contribution of bacteria to lignin degradation in wood, we have chosen to study these microorganisms in the natural wood decay ecosystem known as *Palo Podrido*. Initially, the characterization of bacteria able to metabolize lignin-related compounds present in samples of *Palo Podrido* was undertaken. For their isolation, minimal salt media containing lignin dimers of either the arylglycerol- β -aryl ether (β -O-4) or 1,2-diarylpropane (β -1) types as the only source of carbon and energy were inoculated with various wood samples exhibiting different degrees of decay. The β -1 dimers used failed to support bacterial growth. However, three bacterial consortia able to consume quantitatively the β -O-4 model 1-[3,4-dimethoxyphenyl]-2-[2-methoxyphenoxy]-3-hydroxypropanone (compound 1) were isolated. One of these was further characterized. It is composed of eight strains belonging to the families of Streptomycetaceae, Dermatophilaceae and Actinoplanaceae. HPLC and GC-MS analyses revealed that the consortium utilizes two pathways to degrade β -O-4 dimers, both involving direct cleavage of the ether linkage. The formation of a novel C₆-C₃ degradation intermediate is described. Some metabolic properties of each strain, as well as those of the intact consortium, are also reported.