

University of Minho School of Engineering

Innovative Approaches to Polyphenol Synthesis: Combinatorial Biosynthesis Unveiled



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Polyphenols Biological Extraction from Plants Heterologous Production CENTRE OF **Activities** BIOLOGICAL & Chemical Synthesis & Synthetic Biology ENGINEERING Antioxidant Low amounts/yields/purity • Growth in inexpensive substrates Anti-aging Anti-inflammatory Limited by seasonality/ regional Rapid production cycles • Anti-diabetic Anticancer variations/pests/ extreme weather Higher purity • Estrogenic • Would healing High land/water investment Higher amounts • Menopause treatment Anti-viral Environmentally unfriendly Cholesterol lowering... Cheaper \$3.3 billion • Anti-septic Expensive downstream processes Sustainable by 2032 Skin treatment disorders Complex Not limited by seasonality ŃΗ₂ tyrosine Flavonoids naringenin OCH₃ **Furanocoumarins** Coumarins $R_1=H$, $R_2=H$, psoralen R₁=H umbelliferone OH R₁=OH, R₂=H, xanthotoxol R₁=OCH₃ scopoletin R₁=H, R₂=OH, bergaptol R₁=OH esculetin R₁=OCH₃, R₂=H, xanthotoxin Curcuminoids Prenylflavonoids H₃C⁻ `СН₂ H₂C² CH $R_1=H$, $R_2=OCH_3$, bergapten Prenylflavonoids $R_1 = R_2 = OCH_3$ curcumin xanthohumol 8-prenylnaringenin $R_1=R_2=H$ bisdemethoxycurcumin $R_1=H$, $R_2=OCH_3$ demethoxycurcumin

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