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Three steps-one pot conversion of sinapic acid into 6-hydroxy-5,7-dimethyl naphtanoic acid

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PURPOSE OF THE ABSTRACT

To deal with climate change, bio-sourced alternatives need to emerge in order to replace fossil-based products. Herein, we propose a one-step chemo-enzymatic synthetic route to convert sinapic acid ? that can be extracted from co-product of oleaginous crops such as seed meals of rapeseed, canola or mustard.[1] ? into 6-hydroxy-5,7-dimethoxynaphtanoic acid (DMNA). Indeed, while naphtanoic acid is used as monomer in liquid crystals that can be found in numerous screens (e.g. smartphones),[2] there is no sustainable ways to produce it. It thus seems that DMNA could be of great interest as a bio-based alternative.

Although DMNA can be synthesized through the alkaline degradation of sinapic acid,[3] previous studies reported long reaction time, low yield, and only described reactions performed at the milligrams scale.[4]

In this work, we have designed and optimized a synthetic route to DMNA from sinapic acid involving a laccase-mediated dimerization leading to a bislactone, followed by a sodium hydroxide-mediated rearrangement of the latter. Fine tuning of the second step allowed the selective production of thomasidioic acid, another valuable chemical intermediate. Each compound can be recovered with high purity only by filtration after acidification of the media without the need of a subsequent extraction or purification over silica gel.

FIGURES

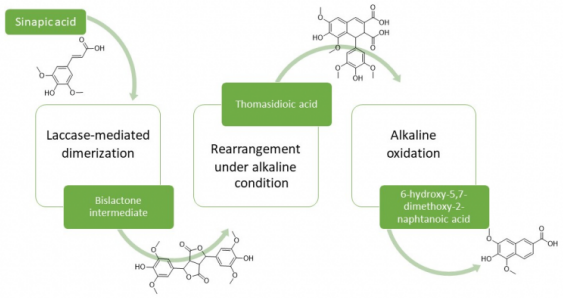

FIGURE 1

From Sinapic acid to DMNA

A one pot-three steps procedure

FIGURE 2

KEYWORDS

Sinapic acid | 6-hydroxy-5,7-dimethoxynaphtanoic acid | Laccase

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