
**Kurzberichte**

**LITERATUR**


**PRODUCTION OF METHYLATED PHENOLIC ACIDS BY SPECIES OF LENTINUS (BASIDIOMYCETES)**

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*Lentinus lepideus* is a suitable organism for studies of cinnamate metabolism because it readily produces the methyl esters of a number of substituted cinnamic acids when grown in liquid culture [1, 2]. We have examined the following species of *Lentinus* and of *Lentinellus*, a closely related genus, for their ability to produce these compounds: *Lentinus lepideus* Fr., *L. ponderosus* O.K. Miller, *L. edodes* (Berk.) Singer, *L. kauffmanii* Smith, *L. tigrinus* Bull. ex Fr., *L. sulphureus* Berk. and *Lentinellus vulgaris* (Fr.) Kühner & Maire. *L. cochleatus* (Fr.) Karst.

Of these only *Lentinus lepideus* and *L. ponderosus* produced methyl esters of phenolic acids when grown under our conditions [3]. *L. ponderosus* yielded methyl cinnamate, methyl \( \beta \)-methoxy-cinnamate, methyl isofluridate and methyl anisate. *L. lepideus* produced methyl \( \beta \)-coumarate in addition to these compounds. The other fungi also produced phenolic compounds but they have not been identified. Neither *L. lepideus* nor *L. ponderosus* produced detectable amounts of free \( \beta \)-coumaric, caffeic or isofluridate acids and there were no qualitative or quantitative differences between light and dark grown cultures of *L. ponderosus*. *L. lepideus* has been previously reported to produce methyl \( \beta \)-methoxy-cinnamate when cultured in dark [4]. Light, therefore, does not seem to play a role in the regulation of cinnamate metabolism in these two species. Increased production of phenylalanine ammonia lyase, the enzyme which catalyzes the synthesis of cinnamic acid from \( L \)-phenylalanine, occurs when certain Basidiomycetes are cultured in light, but this is not a general phenomenon [5, 6].

We have previously reported the occurrence, in *L. lepideus*, of a \( p \)-specific \( O \)-methyltransferase which can only methylate methyl esters of \( \beta \)-hydroxycinnamic acids [3]. This enzyme also occurs in *L. ponderosus*. We also have indirect evidence that a similar enzyme is produced by the rust, *Uromyces phaseoli*, the asexual sporophores of which produce a germination inhibitor, methyl cis-3,4-dime-thoxy-cinnamate [7]. Leaves of the Mexican bean, when infected by this fungus, yield an \( O \)-methyltransferase which catalyzes the methylation of methyl \( \beta \)-coumarate but not \( \beta \)-coumaric acid. Preparations from uninfected leaves are unable to methylate either methyl \( \beta \)-coumarate or \( \beta \)-coumaric acid [8].

"Woody" bracket fungi do not produce typical lignins of higher plants. This has been shown with *Polyporus* and *Fomes* [9], and more recently with *Phellinus igniarius* [10]. These results appear to confirm the prediction of Swan who stated in 1971 that "it appears, therefore, that the fungi possess all the necessary enzymic system to produce lignin precursors, except one. This is the enzyme which catalyzes the methylation of the hydroxyl group oriented *meta* to the side chain, which would yield ferulic acid from caffeic acid . . .” [11].

**EXPERIMENTAL**

_Culture conditions._ All cultures were incubated in 200 ml medium in 500 ml Erlenmeyer flasks as described previously [3].

_TLC, PC and GLC._ TLC and PC have also been described previously [3]. GLC was carried out with a Trace 300 Gas
Two new isomeric coumarins were isolated from leaves of *Boenninghausenia albiflora* Reichb. Their structures were elucidated as (E)-7-hydroxy-6-(3-hydroxy-3-methyl-1-butenyl)-2H-1-benzopyran-2-one and (Z)-7-hydroxy-6-(3-hydroxy-3-methyl-1-butenyl)-2H-1-benzopyran-2-one.

**INTRODUCTION**

The occurrence of many coumarins in *Boenninghausenia albiflora* has been reported [1-7], among which a dimeric coumarin, matsukaze lactone [2], nodakenetin acetate [3] and 3-(1,1-dimethyl allyl)-xanthyletin [4] were reported to be novel.

In the course of our studies on the fragrant components in the essential oil of *B. albiflora*, two compounds were conspicuous because of their strong fluorescence under UV irradiation and higher polarities on TLC. The isolation and structural elucidation of these compounds has now revealed them to be (E)-7-hydroxy-6-(3-hydroxy-3-methyl-1-butenyl)-2H-1-benzopyran-2-one and (Z)-7-hydroxy-6-(3-hydroxy-3-methyl-1-butenyl)-2H-1-benzopyran-2-one. Some other coumarin derivatives which were new in this essential oil were also identified.

**RESULTS AND DISCUSSION**

**Structure of compound 1**

From the ether extract of the steam distillate of the plant a crystalline precipitate separated out on evaporation of the solvent. It had a mp 159-160° after recrystallization from acetone-benzene (compound 1). It gave a...