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Laurent Dufossé, Henry Eric Spinnler, Elisabeth Guichard

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479. CHIRAL γ -LACTONES PRODUCED BY Sporidiobolus salmonicolor
DUFOSSE L., SPINLER H.E., GUICHARD E., Laboratoire de Recherches sur les
Arômes, INRA, 17 rue Sully, F-21034 Dijon cedex, FRANCE

Lactones are known to be flavour compounds for many foodstuffs. Microorganisms are able to produce these molecules which may substitute plant flavours. Sporidiobolus salmonicolor is one of the most studied microorganism for the production of lactones. However very few is known about the different pathways used by this yeast. Lactones biosynthesis is related to fatty acids oxydation. Sporidiobolus salmonicolor is able to produce a family of γ and δ lactones. These have an asymmetric carbon and two enantiomers (R) or (S) may be synthesized. In this work we present that the enantiomeric excess is rather constant with the medium composition or the growth stage but depends on the lateral chain length. Gamma decalactone produced on a glucose mineral medium is optically pure (100 % R), and gamma dodecalactone is found as a racemic. Hypothesis are proposed to explain such observations, based on chirality of precursors or stereospecificity of catabolic enzymes. The understanding of pathways may permit to compare flavour production by plants and by Sporidiobolus salmonicolor.

Subject area :
Agriculture and
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Session :
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INFLUENCE OF CULTURE CONDITIONS ON CHIRAL γ -LACTONE PRODUCTION BY *Sporidiobolus salmonicolor*.

DUFOSSE L.⁽¹⁾, GUICHARD E.⁽²⁾, SPINNLER H.-E.⁽²⁾

(1) SANOFI BIO-INDUSTRIES, 66 avenue Marceau, 75008 PARIS
(2) INRA, Laboratoire de Recherches sur les Arômes, 17 rue Sully, 21034 DIJON Cédex, FRANCE

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INTRODUCTION

Sporidiobolus salmonicolor (Fell and Tallman) is an aroma-producing yeast. Cultured media have a peach-like smelling. TAHARA *et al.* (1975) identified four lactones, whose respective concentrations depend on the medium composition.

The present study determine the enantiomeric composition of five γ -lactones produced in two liquid media. As described for the relative concentrations of lactones, the medium composition may interfere with the chirality of the lactones through the implication of different metabolisms.

EXPERIMENTAL

Microorganism : the strain of *Sporidiobolus salmonicolor* was isolated at the Laboratoire de Biotechnologie, ENSBANA, Dijon, FRANCE.

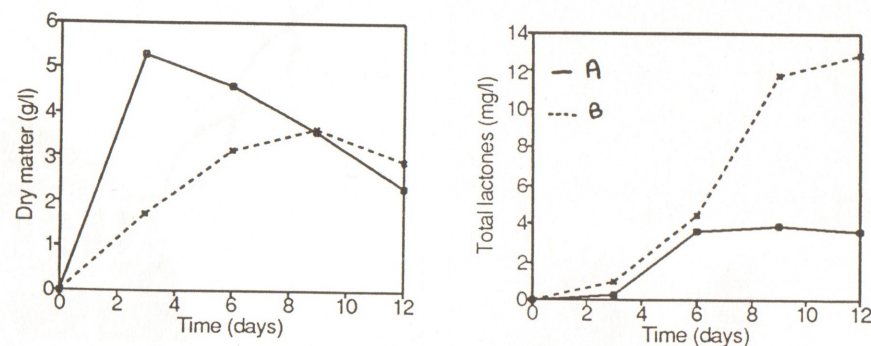
Media and culture conditions : the yeast was grown at 25 °C in 2 liquid media (A and B). Medium A consisted of 1.5 % glucose, 0.05 % bactotryptone, 0.1 % yeast extract, 0.1 % malt agar, 0.2 % casaminoacids, 0.2 % KH₂PO₄, 0.013 % CaCl₂, 2 H₂O, 0.001 % FeSO₄, 7 H₂O, 0.3 % MgSO₄, 7 H₂O, pH 6.0. Medium B consisted of 10 % glucose, 0.25 % asparagine, 0.3 % MgSO₄, 7 H₂O, 0.1 % KH₂PO₄, pH 6.0.

Recovery of the lactones : the cultured media (100 ml) were co-distilled with pure dichloromethane (30 ml) using a LIKENS-NICKERSON apparatus.

Multidimensional gas chromatography : the stereodifferentiation of the lactones was realized with a Sichromat 2-8 gas chromatograph (Siemens), equipped with a DB-1701 bonded fused silica capillary column (J&W, Scientific Inc., 30 m, 0.32 i.d., 1 μ m) coupled to a fused silica capillary column FS-Cyclodex β I/P 10 (d.v.k., 40 m, 0.32 i.d.).

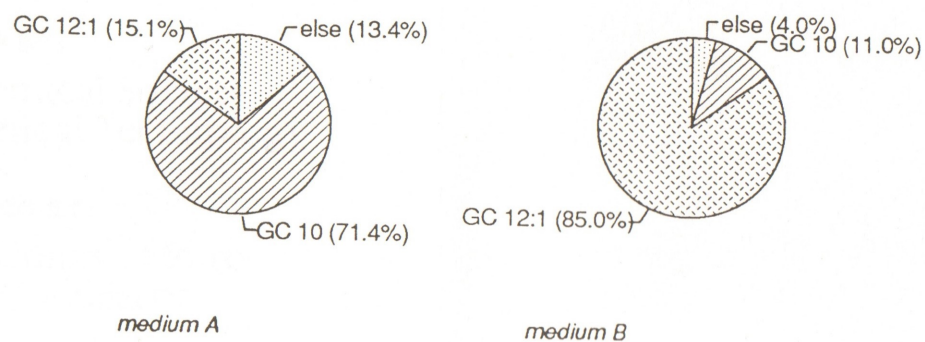
RESULTS

Growth and kinetic of γ -lactone production



Growth in medium A is faster than in medium B, but the total amount of lactones is greater in this second medium.

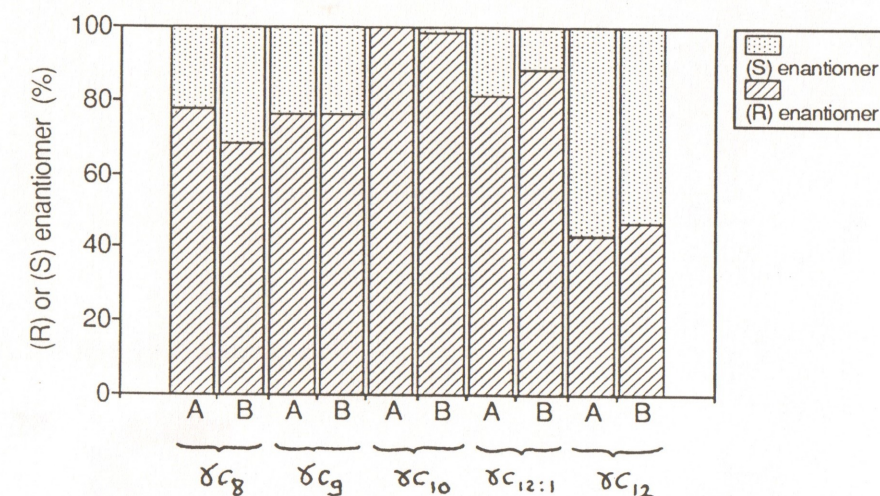
Distribution of γ -lactones in the two media



Stereodifferentiation of the γ -lactones

Generally lactones from chemical synthesis are under a racemic form. Biological formation by fruits or microorganisms of these flavor compounds lead to optically active molecules. The enzymes involved in the pathways may have a stereospecificity.

Stereodifferentiation of the γ -lactones produced by *Sporidiobolus salmonicolor* shows that enantiomeric excess are function of the lactone structure.



Enantiomeric ratios of γ -lactones produced in media A or B are very similar. Results do not vary when cultivation time increase.

CONCLUSION

Whatever is the relative proportion of each γ -lactone biosynthesized by *Sporidiobolus salmonicolor*, these are produced with defined enantiomeric ratios. The medium composition may influence the formation of lactones precursors but their degradation in γ -lactones follow an accurate steric pathway.

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ABSTRACTS

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