TRANSFORMATION OF SOLASODINE BY THE FUNGUS, CUNNINGHAMELLA ELEGANS

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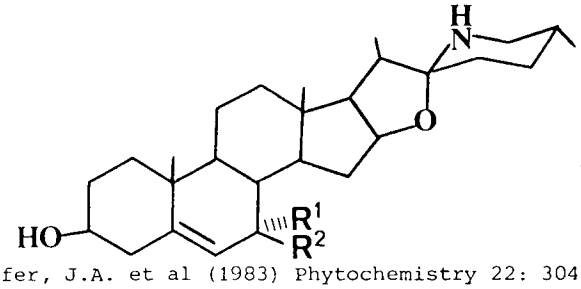
The microbial transformation of steroidal sapogenins and steroidal alkaloids is being investigated in an attempt to determine whether this procedure can be used to produce economically-useful products. Several different fungal species have been used, including Cunninghamella elegans Ledner (CBS 167.53). Incubation of hecogenin {(25R)-3β-hydroxy-5α-spirostan-12-one} with this organism resulted in the formation of three new compounds, which were characterised as 7β-hydroxy-hecogenin, 7-ketohecogenin and 1β,3β-dihydroxyhecogenin (Jaffer et al 1983; Patel et al 1984). Insignificant transformation of hecogenin acetate, hecogenone, tigogenin {(25R)-5α-spirostane-3β-ol}, tigogenin acetate and tigogenone occurred when these compounds were incubated with C.elegans. The transformation of the steroidal alkaloid, solasodine (I) {(25R)-spirosol-5-en-3β-ol}, by Helicostylum piriforme has been reported. The major transformation products were 9α-hydroxysolasodine, 11α-hydroxysolasodine (Sato et al 1961), 7β-hydroxy-solasodine and 7ξ,11α-dihydroxysolasodine (Sato et al 1963). The effects of incubation of solasodine with C.elegans have now been studied.

Solasodine (0.25 mg/ml) was incubated for 5 days with C.elegans using the liquid nutrient and general microbial procedure described by Crabb et al (1977). The mixture was filtered and the filtrate treated as described by Jaffer et al (1983) to produce extract A. The mycelial mass was partially air-dried for 2 days before being extracted with acetone. Removal of the acetone left an aqueous residue which was extracted with dichloromethane. The extract, after drying over anhydrous sodium sulphate, was evaporated to dryness and the residue re-dissolved in chloroform to give extract B. Both extract A and B were examined by thin-layer chromatography and then the individual steroids were isolated by preparative thin-layer chromatography (Blunden et al 1964). Characterisation of the compounds was achieved from mass spectral, proton magnetic resonance and ^{13}carbon nuclear magnetic resonance spectroscopic data.

In both extracts A and B four transformation products were detected in addition to unchanged solasodine. The major transformation product was proved to be (25R)-spirosol-5-ene-3β,7β-diol (7β-hydroxysolasodine) (II). The next most abundant compound was 7α-hydroxysolasodine (III). The other two transformation products were present in small amounts and have not been characterised.

The 7α- and 7β-hydroxylation of solasodine by C.elegans contrasts with the results obtained when hecogenin is incubated with the fungus. Although 7β-hydroxylation occurs, there is no evidence for the introduction of a 7α-hydroxy group.



R1=R2=H = solasodine I

R^1=H; R^2=OH = 7β-solasodine II

R^1= OH; R^2=H = 7α-solasodine III

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