

**NATURAL PRODUCT ISOLATION
AND
TERPENE BIOTRANSFORMATIONS
BY
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ABSTRACT

This thesis is divided into two parts. In part 1 (Chapters 1-3) the transformation of terpenoids by the fungus *Beauveria bassiana* ATCC 7159 is discussed. Part 2 is composed of Chapters 4 and 5 and there the isolation of natural products from *Russelia equisetiformis* is described.

In Chapter 1, the biotransformation reactions by *B. bassiana* is reviewed, as well as the mechanisms of some enzyme-mediated reactions.

The isolation and characterisation of cadina-4,10(15)-dien-3-one and two other sesquiterpenes, namely cadin-4-en-1 β -ol and squamulosone, are reported for the first time from *Hyptis verticillata* (chapter 2). The bioconversion of

cadina-4,10(15)-dien-3-one and its synthetic alcohol cadina-4,10(15)-dien-3 α -ol and the optimisation of fermentation conditions were also examined. Incubation of cadina-4,10(15)-dien-3-one with *B. bassiana* ATCC 7159 resulted in the production of nine novel sesquiterpenes. These metabolites were identified as (4S)-cadin-10(15)-en-3-one, (4S)-cadin-10(15)-en-3 α -ol, (4R)-cadin-10(15)-en-3 α -ol, (4S)-cadin-10(15)-en-3 β -ol, (4S)-cadin-10(15),12-dien-3 β -ol, (4S)-13-hydroxycadin-10(15)-en-3-one, (4S)-12-hydroxycadin-10(15)-en-3-one, (4R)-cadin-10(15)-en-3 β ,14-diol and cadina-4,10(15)-dien-3 α -ol. The allylic alcohol cadina-4,10(15)-dien-3 α -ol was also biotransformed to afford cadina-4,10(15)-dien-3-one, (4S)-cadin-10(15)-en-3-one and (4S)-12-hydroxycadin-10(15)-en-3-one. The insecticidal potential of all the sesquiterpenes and phytotoxicity of the isolated metabolites have been evaluated.

The isolation and bioconversion of terpenes from *Stemodia maritima* is discussed in Chapter 3. The compounds isolated from this plant were stemodinone, stemodin, stemarin, stemolide and stemodinoside A. The biohydroxylation of stemodin and stemodinone by *B. bassiana* gave exclusively stemodane-2 α ,13,18-triol and 13,18-dihydroxystemodan-2-one respectively. Stemarin was converted to the novel stemarane-1 β ,13,19-triol and 13-hydroxystemaran-19-oic acid. The synthesis and biotransformation of novel carbonate, carbamate, phosphate and ester derivatives of stemodin were studied in this chapter.