Detection and relevance of minor amino acids and amino components in Saudi date fruits

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Abstract

Introduction. Whereas an abundance of literature is available on free and protein-bound amino acids (AAs) in date fruits of *Phoenix dactylifera L.*, reports on minor and special non-protein AAs or amino components are rather scarce. Here, we present data with emphasis on minor amino components occurring in various date fruit cultivars.

Results. We have analyzed extracts and acidic hydrolysates of 12 Saudi date fruits harvested at the 'Tamr' stage for amino components. We employed ion-exchange chromatography in the high-performance physiological mode, HPLC using pre-column derivatization with fluorescent AccQ reagent, gas-chromatography (GC) using isotopic standards, and chiral capillary GC of 2HCL hydrolysates using the chiral stationary phase Chirasil-L-ValTM. Besides common proteinAAs, non-coded AAs such as 5-hydroxypipecolic acid, 4-hydroxyproline, 1-aminocyclopropane-1-carboxylic acid (Acc), ß-alanine (ß-Ala), γ-aminobutyric acid (Gaba), and the amino alcohol 2-aminoethanol (Eta) were detected. Evidence was also found for the presence of 5-hydroxylysine. Enantiomeric resolution of L- and D-AAs on Chirasil-L-ValTM revealed the presence of trace amounts (1-3% D-AAs relative to L-AAs) of D-aspartic acid (D-Asp), D-alanine (D-Ala), and D-glutamic acid (D-Glu).

Conclusions. In plants, Acc is precursor of the plant hormone ethylene and quantities might serve as indicators for date ripeness. β-Ala is used for the synthesis of panthotenic acid (vitamin B5). In humans, Gaba plays an important role as neurotransmitter. Food supplements fortified with Gaba have calming effects and promote sleep. Therefore, food rich in Gaba is recommended as natural tranquilizer. Eta modulates the rate of rat hepatocyte proliferation in vitro and in vivo.

D-AAs are the stereoisomers (enantiomers) of protein L-AAs. In the past focus was on possible negative effects of such 'unnatural' AAs in foodstuffs. This point of view has changed entirely. For example, the sodium salt of D-Asp is used as a commercial drug to improve semen quality and testosterone level of man. D-Ala is added to antipsychotic drugs for the treatment of schizophrenia.

Consequently, thorough studies of date fruits regarding minor non-protein AAs and amines using sophisticated state-of-the art analytical techniques will provide new insights in possible health benefits of date fruits not yet taken into account.

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