Substances with Physiological Effects in Several Tissues of Different Coffee Species - Part 1 Diterpenes

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Introduction

Coffea arabica and *Coffea canephora* differ in their diterpenes: while arabica beans contain kahweol and cafestol, Robusta beans contain cafestol, only small amounts of kahweol (usually <400 mg/kg) but 16-O-methylcafestol in addition to traces of 16-O-methylkahweol. The 16-O-methylcafestol is the indicator substance for admixtures of Robusta coffee beans to Arabica coffees.

The physiological effect of the cafestol has so far been examined almost exclusively. An increased glutathione-S-transferase activity was found, which proved to be advantageous in the course of detoxification of aflatoxin B1. The cholesterol-increasing effect is to be regarded as a disadvantage.

First research results on the diterpenes in leaves (Kölling-Speer, ASIC, Nairobi 1997) showed that the occurrence in leaves was surprisingly contrary to that in beans.

The aim of the present study was to analyze the four diterpenes in leaves, roots, branches, blossoms, pulps, and beans of Robusta, different Arabica varieties and other Coffea species.

Materials/Methods

The plant material was provided by the Coffee Research Foundation Ruiru, Kenya and the Greenhouse for Tropical Crops Witzenhausen, University of Kassel, Germany. Each sample was freeze-dried. One coffee leaf tea from India (Coffee Store GmbH, Mannheim, Germany) was delivered by CVUA Karlsruhe, Germany.

The diterpenes were analyzed using DIN 10779 method, modified by direct saponification.

LoQ: 10 mg/kg each.

Results/Discussion

The diterpenes are distributed very differently in the coffee tissues:

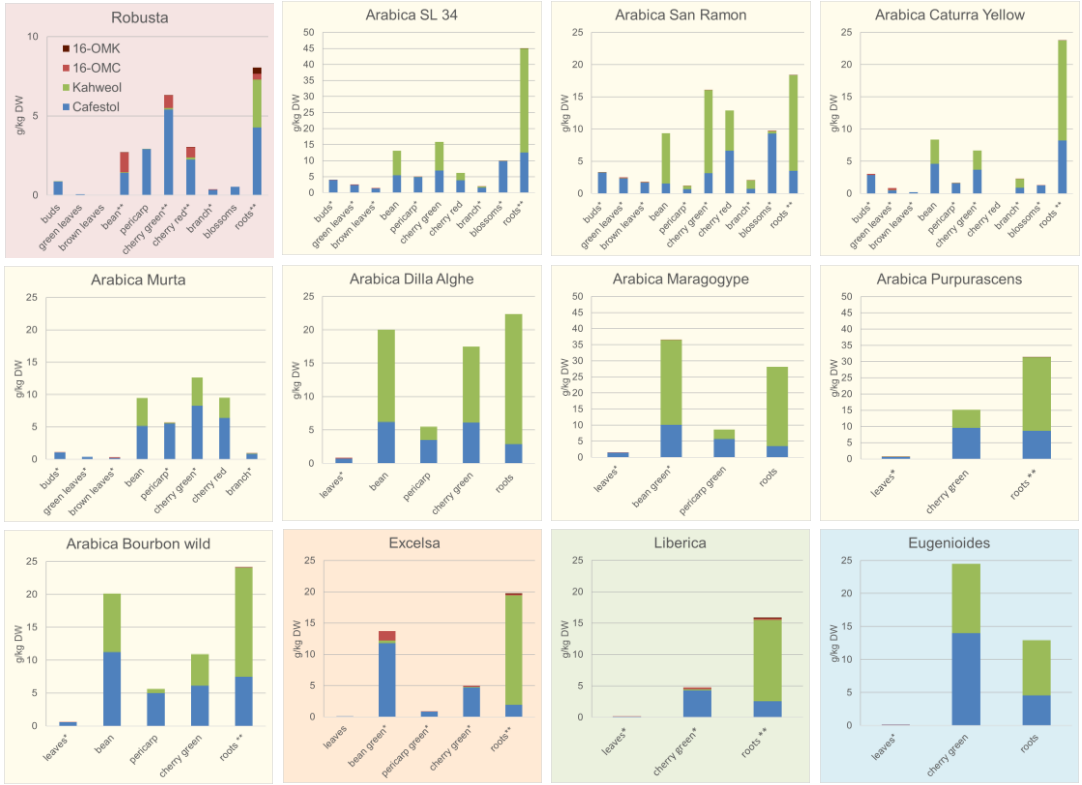
Cafestol is present in all the analyzed tissues and in most cases the predominant diterpene with the exception of the roots.

16-OMC was present in Robusta in the bean, in roots and in small amounts in the branches, but not in the leaves, in the pericarp, and in the blossoms, whereas in Arabica varieties – which were relatively similar – 16-OMC was present in small amounts in the leaves (especially in adult leaves, less in brown ones and young ones); only traces were detected in branches, blossoms, roots and pericarp of some of the Arabica varieties.

Kahweol was mostly the predominant diterpene in the roots both in the Arabicas and in the Robusta, as well in Liberica, Excelsa, Eugenioides.

16-OMK was detectable in the Robusta beans and roots, and in the roots of Arabicas containing 16-OMC. The amounts of 16-OMK in the roots are relatively high in relation to 16-OMC with up to 150 mg/kg (calculated as 16-OMC). Therefore, the roots are a valuable source for obtaining the diterpenes.

In the coffee leaf tea from India, no diterpenes were detectable.



Contents of the 4 diterpenes; * = sample contained 16-OMC, ** = 16-OMC + 16-OMK ; all presented data were from samples from Kenya

References:

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