Application Note
742025H

Analysis of Capsaicin and Dihydrocapsaicin in Capsicum

Introduction

The pungent components (which are responsible for the 'hotness') contained in the fruit of the genus Capsicum are collectively referred to as the Capsaicinoids. Capsaicin and dihydrocapsaicin in Capsicums constitute 80 - 90% of the pungent components; these compounds are now widely used in medical products and health foods.

It is known that the capsaicinoids are present in differing amounts in the various parts of the Capsicum fruit. In this experiment the Capsaicinoid content of the pericarp, seed and placenta from each of four types of capsicum was measured - Capsicum frutescens, Serrano, Finger hot and Habanero.

LC-4000 Series
HPLC System

Experimental

Equipment	
Pump	PU-4180-LPG
Column Oven	CO-4061
Autosampler	AS-4050
Detector	MD-4010

Conditions	
Column	CrestPak C18S (4.6 mmID x 150 mmL, 5 mm)
Eluent A	1% Acetic acid/Acetonitrile (50/50)
Eluent B	Acetonitrile
Gradient	(A/B), 0 min (100/0) --> 15 min (100/0)
Condition	-->15.05 min (0/100) --> 20.00 min (0/100) --> 20.05 min (100/0) 1 cycle; 35.5 min
Flow Rate	1.0 mL/min
Standard Sample	Powdered Coptis japonica (0.5 g/50 mL in methanol / 10% hydrochloric acid (100/1))
Column Temp	40°C
Wavelength	280 nm
Injection Volume	20 mL
Standard Sample	Capsaicin 10, 50, 100 mg/mL in Methanol Dihydrocapsaicin 10, 50, 100 µg/mL in Methanol

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Result

The chromatograms of the 10 µg/mL each of Capsaicin and Dihydrocapsaicin standard sample are shown in Fig. 1. Good separation was obtained within 12 minutes. The sampling procedure of the actual samples is shown in Fig. 2.

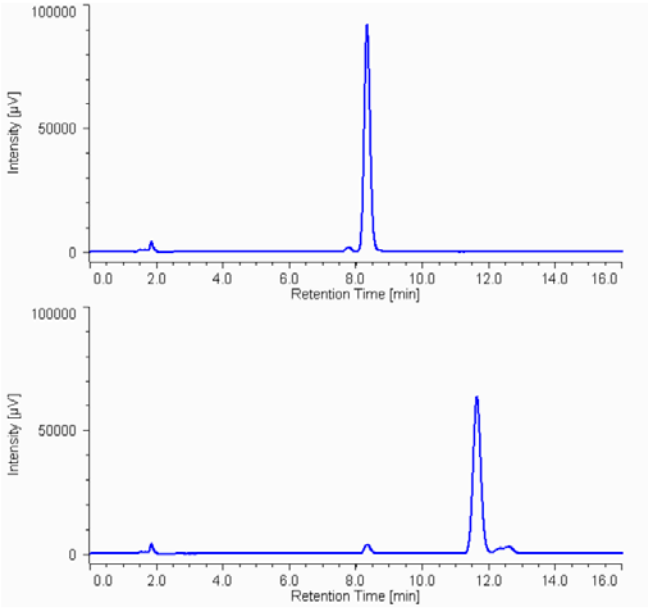

Figure 1. Chromatogram of Capsaicin and Dihydrocapsaicin standard

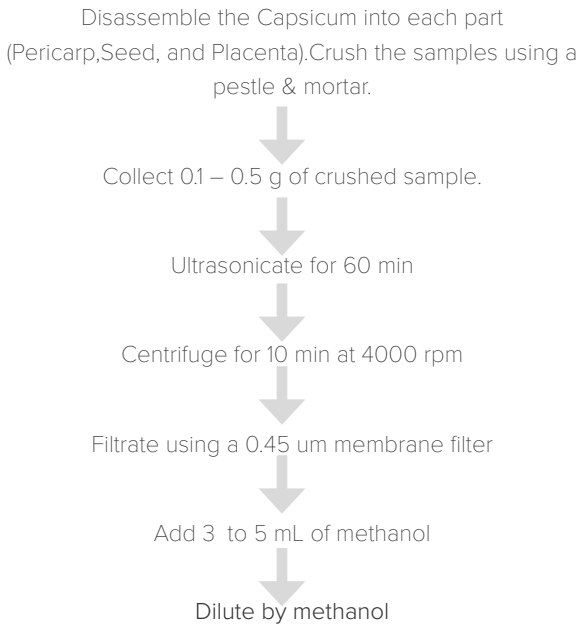

Figure 2. Sample preparation

The chromatograms for each 4 kinds of Capsicum are shown in Fig. 3. In Table 1 the Capsaicin and Dihydrocapsaicin content in the each Capsicum sample (wet weight) are shown. It is known that the contents are very different depending on each part and for the all capsicum, Placenta part contains Capsaicin and Dihydrocapsaicin the most.

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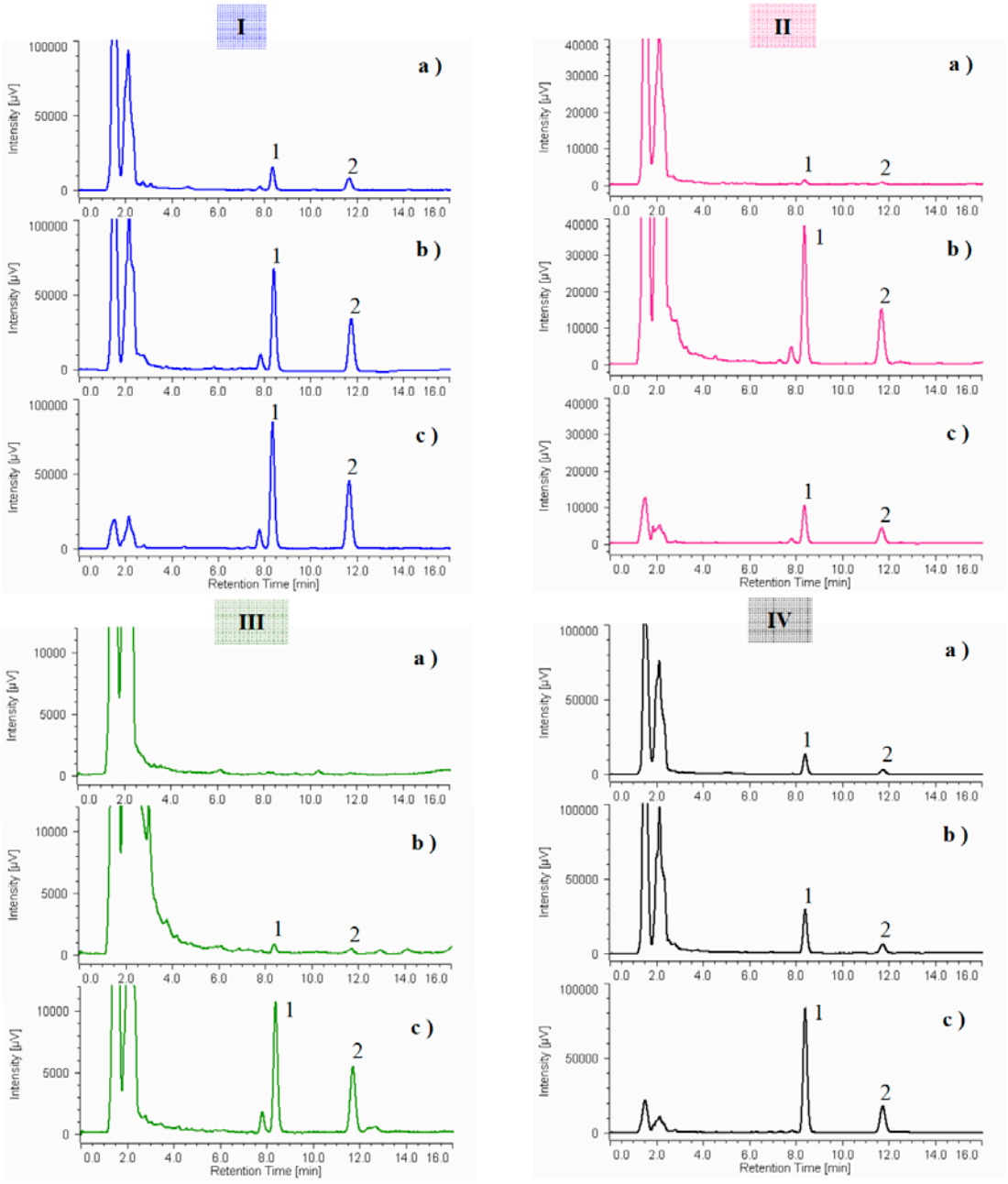

Figure 3. Chromatograms for each of the four species of Capsicum measured. Table 1 shows the Capsaicin and Dihydrocapsaicin content for each Capsicum sample (wet weight). It is well known that the amount of capsaicinoids present is very different depending on the part of the capsicum fruit and is widely different between species; the placenta contains the majority of capsaicin and dihydrocapsaicin, followed by the seed and then the pericarp which may contain little or no capsaicinoids.

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Table 1. Capsaicin and Dihydrocapsaicin content in each part of the Capsicum

Sample	Contents in each sample [μg/g]	
	Capsaicin	Dihydrocapsaicin
Capsicum Frutescens		
Pericarp	154	120
Seed	713	542
Placenta	9540	7410
Serrano		
Pericarp	7.64	4.47
Seed	387	229
Placenta	1080	644
Finger Hot		
Pericarp	Not Detected	Not Detected
Seed	2.89	2.87
Placenta	217	160
Habañero		
Pericarp	134	43.2
Seed	297	92.5
Placenta	8720	2750