

CHARACTERISATION OF ONION *ALLIUM CEPA* L. VAR. HORCAL VOLATILE COMPOUNDS IN "MORCILLA DE BURGOS"

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Introduction

"Morcilla de Burgos" is a popular cooked blood sausage produced in Burgos, in the north of Spain, consisting of a mixture of chopped onion, rice, animal fat, blood, salt and different spices such as black pepper, paprika and oregano. According to the method, kind and amount of spices, and the proportion of ingredients, it is possible to classify Morcilla de Burgos in three different types.

One of the ingredients more characteristic and important in the elaboration of "Morcilla de Burgos" is the kind and percentage of onion used. The onion should be from a regional variety known as Horcal. This onion is white, with a seasonal crop and a short period of storage, but it gives "Morcilla de Burgos" a better sensory quality, also the horcal onion has a flat and elliptical shape and bigger size compared with other types of onions.

Depending on the amount of horcal onion it is possible to classify the different types of "Morcilla de Burgos" in three categories according with the first draft of the regulation to obtain the EU quality label "Protected Geographical Indication", (PGI). The first type is a morcilla with at least 35% of horcal onion. The second one has to have at least 45% of horcal onion and the third one has 50% of horcal onion.

The purpose of this study is the determination of the influence of different horcal onion percentages in the elaboration of "Morcilla de Burgos" in the total volatile profile.

Materials and Methods

Sample preparation: Three batches of 60 morcillas were made with the same formulation with the only difference being the percent of onion added according to the first draft of the regulation for the "Protected Geographical Indication". One batch was made with 35% of horcal onion, because this is the minimum amount for the morcilla to be called "Morcilla de Burgos". The second batch was made with 20% of horcal onion, an amount that is not included in the regulation for the PGI, and the third batch was made with 47% of horcal onion, because it is intermediate between the other two categories.

After peeling four morcillas randomly chosen, they were homogenised in a lab blender, and 2g of this homogenate were introduced into a 20 ml headspace vial.

HS-SPDE sampling: All Solid Phase Dynamic Extraction (SPDE) (Chromtech, Idstein, Germany) sampling steps were automatically controlled by the CTC-Combi PAL software. The SPDE needle coated inside is a PDMS-AC. The vials were all equilibrated at 70°C for 1 min, 50 Strokes, the plunger speed for extraction: 40µl/s; helium volume for desorption: 0.5ml; plunger speed for desorption: 15µl/s; pre-desorption time in the GC injection port: 30 s; desorption temperature: 250°C. Each analysis was performed three times for each sampling.

GC-MS Conditions: Gas chromatographic analyses were performed with an Agilent Technologist 6890N Series GC System (Agilent Technologist, Palo Alto. CA. USA) coupled to a Agilent Technologist 5973i mass spectrometer (Agilent Technologist, Palo Alto. CA. USA). The SPDE syringe was injected automatically into the GC injection port, and thermally desorbed at 250°C. Compounds were separated on a HP5 capillary column (50m length x 0.32mm I.D fused silica capillary column coated with 1.05µm film thickness (Quadrex Corporation. New Haven. USA)). The temperature of the column was programmed starting at 40°C, after injection for 5 min, afterwards temperature was increased at a rate of 3°C/min from 40 to 240°C. Helium gas with a flow of 1ml/min was used as the GC carrier gas. The temperature of the transfer line was 280 °C. During desorption of the SPDE syringe the injector split valve was closed. The effluent from the capillary column went directly into the mass spectrometer, operated in the electron impact (EI) mode with an ionisation voltage of 70eV.

Compounds were identified by comparing their mass spectra with a NIST and Wiley spectrum libraries. These compounds were related to the different ingredients used in the elaboration of "Morcilla de Burgos", by comparing them with previous published spectra obtained from different *Allium cepa* L. varieties, and spices, and also from samples analysed, in the same conditions mentioned above.

Results and Discussion

The results obtained show 117 different volatile compounds found in "Morcilla de Burgos", taking into account all compounds that appear in all the samples analysed. Eighty-three of these compounds have been tentatively identified using the NIST and WILEY libraries. Three of this 83 compounds were acids, 7 were alcohols, 17 were aldehydes, 9 were sulphur compounds, 42 cyclic compounds, 4 hydrocarbons and 1 ketone.

As it was expected, all three samples of morcilla presented the same volatile profile except for the compounds related to the presence of onion. These compounds were the 9 sulphur compounds and the aldehyde 2-Methyl 2-Pentenal. The number and intensity of these chromatographic peaks decreased with the percent of onion in the formulation of the "Morcilla de Burgos". In this way, "Morcilla de Burgos" showed 10, 9 and 6 chromatographic peaks for morcilla with 47, 35, and 20% of onion in its formulation. Table 1 shows seven out of ten volatile compounds related with horcal onion and three volatile compounds related with the more important species for the samples analysed.

Table 1: Volatile compounds extracted in the headspace with PoliDiMethylSiloxane-Active Charcoal-SPDE (expressed en AAU x 10⁻⁷) in each one of the samples analysed.

Peak Number	Retention Time	% Onion			Compound
		47	35	20	
10	18.78	63.41 ^c	44.59 ^b	34.12 ^a	2-Methyl 2-pentenal
11	21.60	1.17 ^c	0.56 ^b	nd	2,4-Dimethyl- thiophene
13	23.19	7.39 ^c	3.85 ^b	2.09 ^a	3,4-Dimetil- thiophene
15	24.74	16.49 ^c	11.73 ^b	4.83 ^a	Methyl propyl disulphide
37	34.64	14.35 ^c	10.52 ^b	6.18 ^a	Dipropyl disulphide
38	35.07	3.25 ^c	1.98 ^b	0.76 ^a	Trans-Propenyl propyl disulphide
43	45.98	0.53 ^b	nd	nd	Dipropyl trisulphide
21	27.61	43.78 ^a	39.32 ^a	44.41 ^a	β-Pinene
25	29.36	155.53 ^a	136.94 ^a	158.73 ^a	Δ 3-Carene
29	30.33	118.66 ^a	107.12 ^a	129.77 ^a	dl-Limonene

Means in the same row with different letters (a-c) are significantly different (P < 0.05).

nd: not detected.

AAU: Arbitrary Area Units.

Conclusions

According to the results obtained in this study, it can be conclude that the differences in the volatile profile of the samples analysed are due to the amount of Horcal onion used in the elaboration of the morcilla. These differences are shown in the number of peaks related with the onion percent in the composition of morcilla and also in the different intensity of the chromatographic peaks, in terms of the percent of onion.

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