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Data Article

Data on green Spanish-style Manzanilla table olives fermented in salt mixtures



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ABSTRACT

This article contains processed data related to the research published in “Fermentation in nutrient salt mixtures affects green Spanish-style Manzanilla table olives” [1]. It displays information on the salt substitution by other nutrient salts (potassium chloride and calcium chloride) during fermentation of green Spanish-style Manzanilla table olives to produce healthier products. Particularly, it studies the relationship between the different colour parameters (L^* , a^* , b^* and C_i), firmness, and sensory attributes (saltiness, bitterness, hardness, and fibrousness), and the composition of the initial brine in NaCl, KCl, and CaCl₂. The composition of the brines affected the characteristics of the product. In general, the higher was the proportion of CaCl₂ in the initial brines the better was the colour. Also, the presence of this salt mitigated the saltiness perception but increment those of bitterness, hardness, fibrousness, and crunchiness. Besides, most of the sensory attribute scores could successfully be predicted as a function of the Na, K, and Ca concentrations in the fermented olive flesh. The work allows the production of table olives with specific characteristics and pre-determined mineral nutrient composition.

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Specifications Table

Subject area	<i>Chemistry</i>
More specific subject area	<i>Food Chemistry</i>
Type of data	<i>Graphs, table</i>
How data was acquired	<i>Colour, using a BYK-Gardner Model 9000 Colour-view spectrophotometer (Columbia, USA). Firmness, using a Kramer Shear compression cell coupled to an Instron Universal Testing Machine (Canton, MA, USA). Mineral concentrations by AA, using a GBC model 932 AA (Victoria, Australia), equipped with three hollow multi-element cathode lamps (Cu and MN; Ca, Mg, and Zn; or Na and K). Sensory analysis by evaluating the sample by a trained panel</i>
Data format	<i>Analysed</i>
Experimental factors	<i>Olives were fermented in 15 different salt mixtures for 130 days at room temperature</i>
Experimental features	<i>The experimental design consisted of 15 independent runs from an enlarged simplex centroid mixture design with three replicates</i>
Data source location	<i>Instituto de la Grasa (Bellavista, Sevilla, Spain)</i>
Data accessibility	<i>Data are in this article.</i>

Value of the data

- The equations of the colour, firmness, sensory attributes as a function of the NaCl, KCl, and CaCl₂ in allow obtaining fermented products with specific characteristics.
- The relationship between the initial salt concentrations in the fermentation brines, and the content of mineral nutrients in the olive flesh provides a valuable tool for processing olives with pre-determined nutritional value.
- The correlation found between the mineral nutrient contents and the sensory perceptions is interesting. It opens the opportunity for marketing more adapted to the consumers' demand products.
- The production of healthier products could lead to an enlargement of the table olive consumption and, as a result, of the economic development of the producing regions.

1. Data

The information provided present the equations that relate the concentrations of the various salts in the brines prepared with salt mixtures with the most important characteristics of the fermented tables olives like colour, firmness sensory attributes, and concentration of the mineral contents in the flesh (Table 1). Also, the relationships of the mineral content in the flesh with the observed sensory scores are presented (Table 1). On the other hand, the graphical presentations (including contour lines) of some of these equations visualize the values of colour, firmness, and sensory values (scores) that could be obtained for the diverse combinations of salt mixtures (Figs. 1, 2 and 3). Finally, the prediction goodness of saltiness, bitterness, and harness is also graphically shown (Fig. 4).

2. Experimental design, materials and methods

The experimental design consisted of 15 independent runs from an enlarged simplex centroid mixture design with three replicates [2]. The measures of colour were obtained using a BYK-Gardner

Table 1

Fermentation of green Spanish-style Manzanilla tables olives in nutrient salt mixtures (NaCl, KCl and CaCl₂). List of equations relating salt concentration on the salt mixtures (brines) with the characteristics of the fermented product.

Colour

$$C_i = +0.266 \cdot [\text{NaCl}] + 0.273 \cdot [\text{KCl}] + 0.360 \cdot \text{CaCl}_2 \quad (1)$$

$$L^* = +0.522 \cdot [\text{NaCl}] + 0.543 \cdot [\text{KCl}] + 0.435 \cdot [\text{CaCl}_2] + 0.004 \cdot [\text{NaCl}] \cdot [\text{CaCl}_2] \quad (2)$$

$$b^* = +3.784 \cdot [\text{NaCl}] + 4.211 \cdot [\text{KCl}] + 4.582 \cdot [\text{CaCl}_2] \quad (3)$$

Firmness

$$\begin{aligned} \text{Firmness (kN/kg pitted olives)} = & +0.21 \cdot [\text{NaCl}] + 0.17 \cdot [\text{KCl}] + 0.29 \cdot [\text{CaCl}_2] \\ & - 0.003 \cdot [\text{NaCl}] \cdot [\text{KCl}] + 0.002 \cdot [\text{NaCl}] \cdot [\text{CaCl}_2] - 0.026 \cdot [\text{KCl}] \cdot [\text{CaCl}_2] \\ & + 0.0079 \cdot [\text{NaCl}] \cdot [\text{KCl}] \cdot [\text{CaCl}_2] \end{aligned} \quad (4)$$

Nutrient mineral in flesh (added in the fermentation brine)

$$\text{Na (mg/kg flesh)} = 176.741 \cdot [\text{NaCl}] + 7.458 \cdot [\text{KCl}] - 6.009 \cdot [\text{CaCl}_2] \quad (5)$$

$$\begin{aligned} \text{K (mg/kg flesh)} = & 7.526 \cdot [\text{NaCl}] + 358.888 \cdot [\text{KCl}] + 4.084 \cdot [\text{CaCl}_2] \\ & - 1.807 \cdot [\text{NaCl}] \cdot [\text{KCl}] + 0.124 \cdot [\text{NaCl}] \cdot [\text{CaCl}_2] - 1.973 \cdot [\text{KCl}] \cdot [\text{CaCl}_2] \end{aligned} \quad (6)$$

Note: The equation for Ca was significant but had a significant lack of fit also.

Other mineral nutrients (originally found in flesh)

$$\begin{aligned} \text{Zn content in flesh (mg/kg)} = & +0.030 \cdot [\text{NaCl}] + 0.027 \cdot [\text{KCl}] + 0.038 \cdot [\text{CaCl}_2] \\ \text{P content in flesh (mg/kg)} = & 1.170 \cdot [\text{NaCl}] + 0.903 \cdot [\text{KCl}] + 1.584 \cdot [\text{CaCl}_2] \end{aligned} \quad (7)$$

$$\begin{aligned} & + 0.004 \cdot [\text{NaCl}] \cdot [\text{KCl}] - 0.0073 \cdot [\text{NaCl}] \cdot [\text{CaCl}_2] - 0.029 \cdot [\text{KCl}] \cdot [\text{CaCl}_2] \\ & + 0.001 \cdot [\text{NaCl}] \cdot [\text{KCl}] \cdot [\text{CaCl}_2] \end{aligned} \quad (8)$$

Sensory characteristics

$$\text{Saltiness} = +0.006 \cdot [\text{NaCl}] + 0.007 \cdot [\text{KCl}] - 0.025 \cdot [\text{CaCl}_2] \quad (9)$$

$$\text{Bitterness} = -0.0151 \cdot [\text{NaCl}] - 0.0101 \cdot [\text{KCl}] + 0.0529 \cdot [\text{CaCl}_2] \quad (10)$$

$$\text{Hardness} = -0.0038 \cdot [\text{NaCl}] - 0.0225 \cdot [\text{KCl}] + 0.0333 \cdot [\text{CaCl}_2] \quad (11)$$

$$\text{Fibrousness} = -0.0007 \cdot [\text{NaCl}] - 0.0220 \cdot [\text{KCl}] + 0.0195 \cdot [\text{CaCl}_2] \quad (12)$$

$$\text{Crunchiness} = -0.0020 \cdot [\text{NaCl}] - 0.0263 \cdot [\text{KCl}] + 0.0320 \cdot [\text{CaCl}_2] \quad (13)$$

Relationship between sensory attributes and Na, K and Ca contents in flesh

$$\text{Saltiness} = 1.97 - 6.03\text{E} - 05 \cdot [\text{Na}] - 3.43\text{E} - 05 \cdot [\text{K}] - 3.33\text{E} - 04 \cdot [\text{Ca}] \quad (14)$$

$$\text{Bitterness} = 0.33 - 1.20\text{E} - 04 \cdot [\text{Na}] - 5.79\text{E} - 05 \cdot [\text{K}] + 3.64\text{E} - 04 \cdot [\text{Ca}] \quad (15)$$

$$\text{Hardness} = 3.54 - 2.18\text{E} - 04 \cdot [\text{Na}] - 2.09\text{E} - 04 \cdot [\text{K}] - 1.86\text{E} - 05 \cdot [\text{Ca}] \quad (16)$$

$$\text{Fibrousness} = -1.44 + 6.27\text{E} - 05 \cdot [\text{Na}] - 3.11\text{E} - 05 \cdot [\text{K}] + 2.55\text{E} - 04 \cdot [\text{Ca}] \quad (17)$$

$$\text{Crunchiness} = 3.48 - 2.04\text{E} - 04 \cdot [\text{Na}] - 2.24\text{E} - 04 \cdot [\text{K}] - 1.84\text{E} - 05 \cdot [\text{Ca}] \quad (18)$$

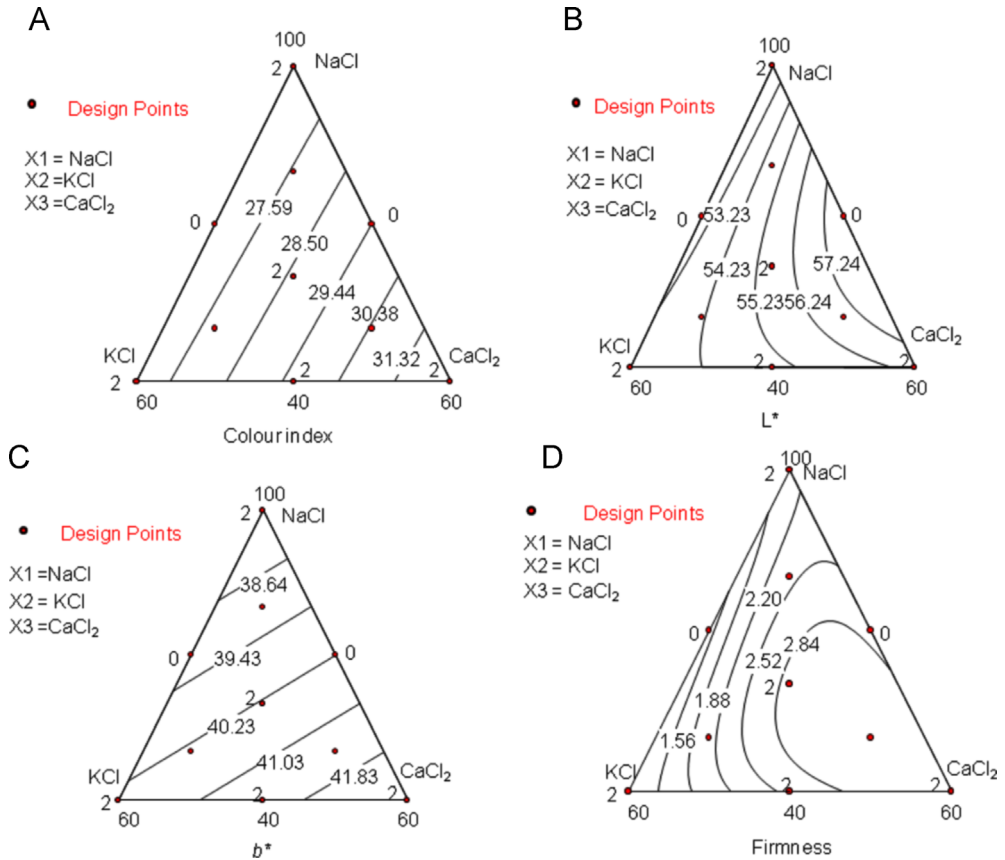


Fig. 1. Fermentation of green Spanish-style Manzanilla tables olives in nutrient salt mixtures (NaCl, KCl and CaCl₂). Contour lines of (A) Colour index, (B) L* (luminance), (C) b*, and (D) firmness of fermented Manzanilla olives as a function of the salt concentrations in the initial brines (details of runs in [1], Table 1). Duplicate design points are indicated by a two close to them. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Model 9000 Colour-view spectrophotometer (Columbia, USA) [3]. The firmness was measured by using a Kramer Shear compression cell coupled to an Instron Universal Testing Machine (Canton, MA, USA) [3]. The mineral content in the flesh was analysed by dry ashing the olive pulp, followed by solubilization of the minerals in diluted HCl. Then, the elements were estimated by atomic absorption spectrometry using a GBC model 932 AA (Victoria, Australia), equipped with hollow multi-element cathode lamps (Ca, Mg, and Zn; Na and K) [4]. The sensory analysis was carried out by a trained and experienced panel test, using the descriptors included in the Sensory Analysis for Table Olives issued by the International Olive Oil Council [5]. The data were studied following QDA [6–8] and chemometric techniques [9,10]. The contour lines in the triangular graphs were obtained by plotting the corresponding equations for specific responses.

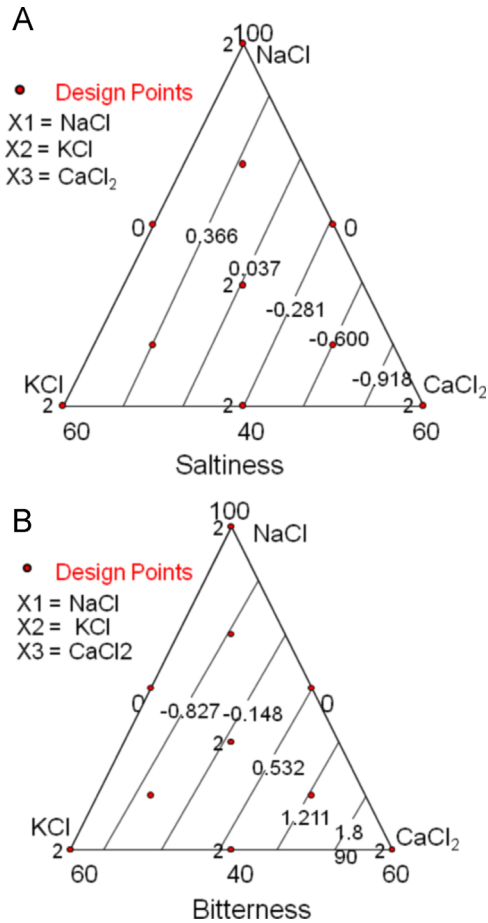


Fig. 2. Fermentation of green Spanish-style Manzanilla tables olives in nutrient salt mixtures (NaCl, KCl and CaCl₂). Changes in (A) saltiness and (B) bitterness centred scores, according to the salt concentrations in the initial brines (details of runs in [1], Table 1). Duplicate design points are indicated by a two close to them.

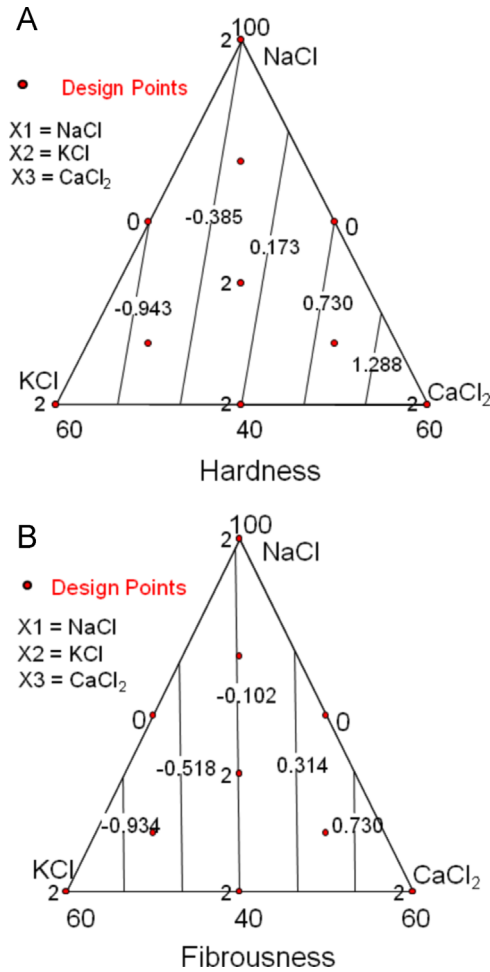


Fig. 3. Fermentation of green Spanish-style Manzanilla tables olives in nutrient salt mixtures (NaCl, KCl and CaCl₂). Contour lines of (A) hardness, and (B) fibrousness centred scores as a function of the salt concentrations in the initial brines (details of runs in [1], Table 1). Duplicate design points are indicated by a two close to them.

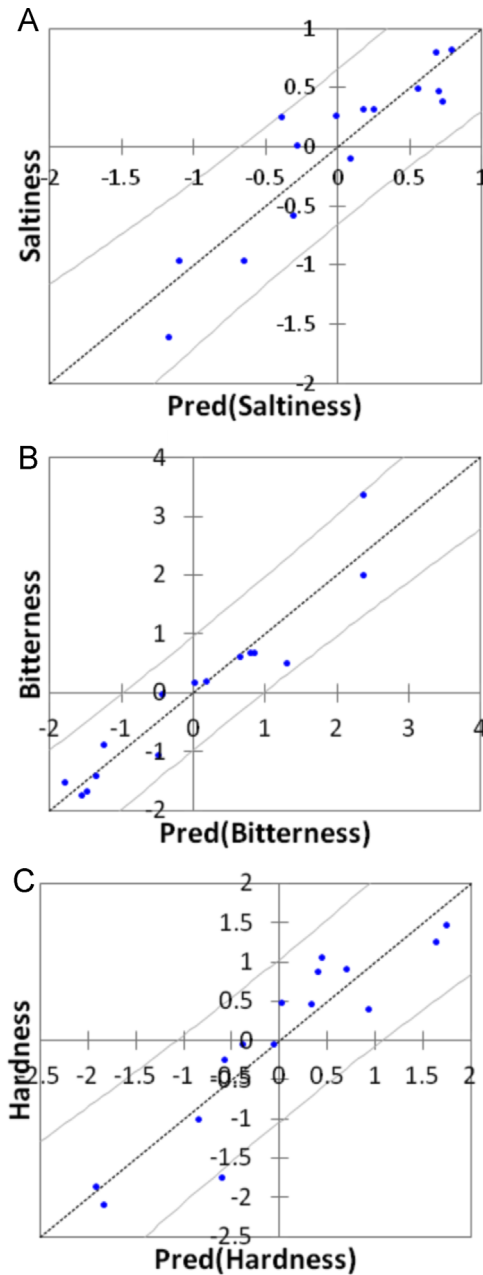


Fig. 4. Fermentation of green Spanish-style Manzanilla tables olives in nutrient salt mixtures (NaCl, KCl and CaCl_2). Confidence limits for the relationship between saltiness, bitterness, and hardness as a function of their predictions (according to Na, K, and Ca contents in the fermented Manzanilla olive flesh).

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Transparency document. Supplementary material

Transparency data associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.dib.2016.06.036>.

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