Lifelong Learning Programme

TOL4FOOD

D 9. Sensory methodology for evaluation of sugar-free traditional plum jams

Introduction

A traditional food product from the consumers' point of view can be defined as "a product frequently consumed or associated with specific celebrations and/or seasons, normally transmitted from one generation to another, made accurately in a specific way according to the gastronomic heritage, with little or no processing/manipulation, distinguished and known because of its sensory properties and associated with a certain local area, region or country" [1]. European research on traditional products is growing [2].

Plums are fleshy fruits of the family Rosaceae. The large-fruited European type, *Prunus domestica*, is the most important type and it originated in the Caucasus Mountains. Plums have been extensively hybridized; more than 2000 varieties exist, but only a few are commercially important [3].

The plum (*Prunus domestica*) is the main traditional fruit tree cultivated in Romania – one of the top plum producers in the world. During 2007-2011, Romanian plum production has reached an average of 511,340 tonnes per year. Analyzing medium productions (2007-2009), Romania brought forth 9.3% of the plum production related to the total production of fruits and vegetables in EU. Plum culture is mainly focused on fresh consumption, alcohol production (plum brandy named tuica) or processing into jam and marmalade.

For plum jam manufacturing, plums at maturity ripening are used derived from Brumarie varieties (*Prunus domestica L. ssp domestica* – the most popular plum variety in Romania) and their derivatives: Stanley, Early Tuleu, Fat Tuleu and Anna Spath. In the manufacturing process of jam, sufficiently ripe plums are used; the fruits should be healthier, not spoiled, with no sign of rottenness and without mechanical damage or visible damage produced by insects or other pests.

Plum jam quality is increased because skins are used in the preparation of jam, skin being richer in vitamins, fibers and antioxidants than the pulp.

Plums have some health benefits over immune system, nervous and muscular system due to naturally high content of fiber, potassium, magnesium, vitamins, natural carbohydrates, antioxidants also, prevents stress, strengthening the natural mechanisms of stress adaptation [4, 5, 6]. It stimulates the bowel and reduces hepatomegaly (liver volume normalized).

Plum jam without sugar is obtained by boiling the plums without sugar or other ingredients added. The category of jam products is regulated by Council Directive 2001/113/EC relating to fruit jams, jellies and marmalades and sweetened chestnut purée intended for human consumption, which stipulates a content of soluble dry substance for jams of 60% or even more.

Between 2005 and 2011, seven plum jam products without sugar added were registered as traditional Romanian product with the Ministry of Agriculture and Rural Development [7] and only one was certified as traditional product at European level.

Food authentication is of concern to food processors that do not wish to be subjected to unfair competition from unscrupulous processors who would gain an economic advantage from the misrepresentation of the food they are selling. Chemometric analysis of the data provided by analytical instruments which have the ability to determine more than one component at a time in a sample can be a support to establish links to the food origin. If the components have sufficient discriminatory power, the set of their concentrations will form a characteristic pattern or 'fingerprint' relating to the geographical origin of the sample. Chemometrics provides the ability to detect these patterns, and is essentially helpful when the number of components necessary to differentiate samples from different geographical origins increases.

Electronic nose technology is based on the detection by an array of semi-selective gas sensors of the volatile compounds present in the headspace of a food sample. Advantages of electronic nose technology include the relatively small amount of sample preparation that is involved and the speed of analysis.

There has been some success using electronic nose technology for the differentiation of olive oils on the basis of geographical origin and theadulteration with either sunflower oil or olive-pomace oil. Electronic nose analysis of sunflower oil and different grades of olive oil demonstrated that it was also possible to differentiate extra virgin olive oil, non-virgin olive oil and sunflower oil very selective for particular types of compounds thus preventing any real identification or quantitation of individual compounds present in a food sample.

Authenticity studies with electronic nose have also been successfully carried out for the differentiation of some traditional jam samples.

The approach was to combine physical-chemical characteristics with the instrumental analysis and with the sensory evaluation using consumers and panelists to elaborate a potential methodology for authenticity of plum jams from different regions.

Physico-chemical analysis

- Total sugar and reducing sugar content (according to Schoorl method); sucrose content - calculated by difference between the total sugar and reducing sugar contents;
- Dry matter content -by drying the sample in oven at 105°C and dried to a constant weight; soluble dry matter - determined by refractometry;
- Acidity-measured by titrimetric method according to SR ISO 750:2008;
- Texture properties of jams - measured using a Texture Analyzer
- Color parameters -using a colorimeter (HunterLab MiniScan™ XE Plus Spectrocolorimeter).

Map of volatile composition

The electronic nose system FOX 4000 combined with HS100 auto-sampler together with α Soft version 8.0 software for data processing (Alpha M.O.S., Toulouse, France) can be employed to study the headspace of jam samples. The system comprises of an array of 18 metal oxides sensors (MOS) placed in three controlled temperature chambers. Before analyzing, the electronic nose system must be calibrated using a

standard (solutions in water) testing kit based on: propanol 0.1%, acetone 0.1% and iso-propanol 0.005%.
2 g of jam sample are placed in a 10 mL vial that is hermetically capped with a PTFE/silicone septum and incubated for 600 s at 80°C under agitation (500 rpm) for headspace generation. Synthetic air and nitrogen are used as carrier gas with a flow of 150 ml/min. A 1500 μL volume is injected at an acquisition time of 120 s.

Sensory evaluation

Sensory analysis of sugar-free plum jams can be carried by a panel of consumers (untrained evaluators in a ahigh number, more than 50), both male and female, using a hedonic scale of 9 points for overall acceptability. Samples must be served in disposable, odor-free plastic cups as necessary for the product type.
Further, a quantitative descriptive test can be used to determine the intensity of several attributes in the samples: appearance, color, taste, sweet degree, degree of sour, smell, consistency, adhesion and after-taste. Trained panelists must be involved in this evaluation, scoring the attributes from 1 (low intensity) to 5 (high intensity).

Statistical analysis

All data must be subjected to a statistical analysis (i.e. analysis of variance ANOVA).

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