

Comparison and Consumer's Preference on Jam and Jelly from "Mastrantonio" Sweet Cherry Fruits [†]

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Abstract: The Sicilian territory is characterized by many peculiarities both of environmental and biological nature that results in unique features in the cherry growing along the slopes of volcano Etna. Particular attention is paid to the typical varieties of sweet cherry 'Donnantonio' or 'Mastrantonio' which since 2011 is specifically included among those recognized in the disciplinary for the use of the "Ciliegia dell'Etna" DOP trademark. The fruit of this cultivar is well known and appreciated by consumers for its specific characteristics: medium-large size, dark red skin, bright, sweet and crunchy, and very pleasant pulp. Moreover, they are an excellent source of many nutrients and phytochemicals, which contribute to a healthy diet. Jam and jelly were handcrafted produced from 'Mastrantonio' sweet cherry; using in both products' agave syrup, which has a much lower glycemic index than common sugar. Therefore, jam was divided in two batches. The first part was kept as control (jam1) while to the second half of jam had locust bean gum (LBG) added to it as thickener (jam2). During jelly production, a part was cooked following the traditional recipe (jelly1) whereas in the other part an aliquot of lemon juice (jelly1) was added (during cooking). We decided to apply a discriminating sensory test, a paired-comparison preference test, an analytical method commonly used to identify if there are any perceptible differences between products. Randomized samples were evaluated by 30 judges, who indicated the best thickness between jams ($\alpha = 0.05$; $\beta = 0.3$ pd = 40%) and the highest sweetness between jellies ($\alpha = 0.2$; $\beta = 0.1$ pd = 40%); all participants were chosen among sweet cherry's producer. Jam with the addition of LBG was statistically recognized as different and selected as the best choice for texture achieved; while between tested jellies any statistical difference was found. Results underlined how the LBG use, although still not very common in traditional recipes, is a good thickener, as perceived by consumers, while for jelly, the test's result highlighted how the aliquot of lemon juices added was not enough to induce a difference in consumers taste.

Keywords: quality; texture; color; sensorial choice; sweet cherry

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1. Introduction

Fruits and vegetables are often seasonal, and their shelf life, as well as their presence on the market are often limited, moreover also their economic value is very different and related with their abundance. For these reasons to overcome both aspects, they can be processed to improve their quality and their economic value.

The Sicilian territory is characterized by many peculiarities both of environmental and biological nature that results in unique features in the agronomical production along the slopes of volcano Etna. Particular attention is paid to the typical varieties of sweet cherry 'Donnantonio' or 'Mastrantonio' which since 2011 is specifically included among

those recognized in the disciplinary for the use of the “Ciliegia dell’Etna” DOP trademark. Fresh sweet cherry ‘Mastrantonio’ are on the market for a short period, usually from June to August. The fruit of this cultivar is well known and appreciated by consumers for its specific characteristics: medium-large size, dark red skin, bright, sweet and crunchy, and very pleasant pulp. Moreover, they are an excellent source of many nutrients and phytochemicals, which contribute to a healthy diet.

Cooking jams, jellies and marmalades using fruits, sugar, pectin and edible acids is one of the oldest foods preserving processes known to mankind allowing fruit consumption in the off-season [1]. Fruit jams and jellies are very popular among consumers, they are appreciated for their sweetness, flavor, taste, texture, color and aromatic profile. Usually, in those productions pectin or agar-agar are used as thickeners. The flour obtained from the industrial transformation of the carob seeds of Locust Bean Gum (LBG), reported in the European list of foods additives as E 410, is used as thickening and stabilizing agent in food preparations thanks to its ability to form viscous solutions and to stabilize emulsions and dispersion. Often lemon juice is added to food preparations to slow down acidity (pH) and to control the microbial population but also to improve the color, contributing to a clearer and more colorful product. Fruits are generally rich in bioactive compounds like phenolics, flavonoids, carotenoids, vitamins, etc., which are heat-labile components some researchers studied how the loss of bioactive compounds during processing may be elevated or retarded by the product (jam/jelly) composition like sugar, type and concentration of pectin, fruit and its cultivar, and pH [2].

This study was conducted to find a new opportunity to allocate a valuable by-product obtained from sweet cherry “Mastrantonio”, in line to determine the best jam’ recipe using LBG as thickener and identify the suitable amount of lemon juice to add in the jelly.

2. Materials and Methods

Locally grown sweet cherry “Mastrantonio” (*Prunus avium* L.) were collected directly from producers. Prior to processing, fruits were stored at ambient temperature. The ingredient used for jam and jelly production were: sweet cherry pulp, sweet cherry juice, agave syrup, lemon juice, pectin, locust bean gum (LBG) in variable proportions.

Figure 1 shows general processing steps for jam and jelly production.

As reported in Figure 1, the difference between jam and jelly was on the ingredients. In jam we added pectin or locust bean gum (LBG) as thickener; in jelly in a part of the production we added an aliquot of lemon juice. In Table 1 are reported the experimental design of jam and jelly variables;

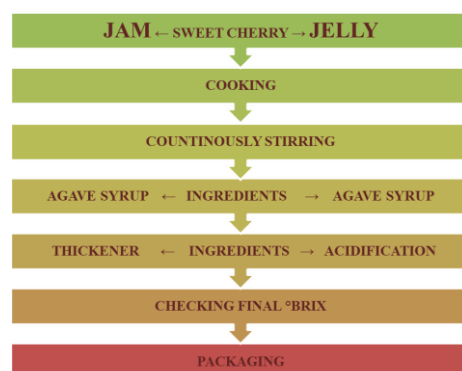


Figure 1. General processing steps for jam and jelly production.

Table 1. Ingredients used and codification of samples.

	Jam 1	Jam 2	Jelly 1	Jelly 2
Thickener	pectin	LBG *	-	-
Acidifying	-	-	-	Lemon juice

* LBG: locust bean gum.

Consumer Evaluation

Panelists were chosen from producers, staff, students and visitors who attended the seminar titled “Sustainable innovation to improve the DOP *Ciliegia dell’Etna*” organized by University of Catania and partners. They were selected based on their knowledge of sweet cherry fruits, as well as their regular consumption of jams and jellies. We decided to apply a discriminating sensory test, a paired-comparison preference test, an analytical method commonly used to identify if there are any perceptible differences between products [3]. Randomized samples were prepared organizing samples X and Y (jam) and A and B (jelly) in the corrected way in order that combination XY and YX (jam) as well as AB and BA appeared the same number of time and simultaneously, they were assigned casually among judges [4]. To the panelists was each given a questionnaire and one plate, the latter was divided in four parts, reporting four numerical codes, one for each quarter. The upper half part was for jellies and lower half part was for jams. Panelists were also instructed to rinse their mouths with water between different samples. The questionnaire had two questions: a) to write which sample had the highest sweetness between jellies; b) to write which sample had the best thickness between jams. Everyone had to indicate a preference, even if not perceptible.

Statistical analysis was done by using the SPSS package version 11.0 (SPSS for window, SPSS Inc., Chicago, IL, USA). Statistical significance was accepted at P value less than 0.05.

3. Results and Discussion

Results were elaborated calculating the amount of each preference expressed and were considered significant for the following one-way values [4].

Statistical values were recorded and analyzed as suggested by Pellegrini [4] and reported in Table 2.

Jam with the addition of LBG was statistically recognized as different and selected as the best choice for texture achieved (23 correct answers); LBG confirm is high technological value. Results underlined how the LBG, although still not very common in traditional jam’ recipes where pectin and agar are often preferred for their lower cost, can be considered a good thickener, as perceived by consumers. The interest of the food industry in LBG is wide and proved by many studies; it is useful to know rheological properties of LBG and the potential applications in food technologies [5].

Between tested jellies any statistical difference was found (19 correct answers); probably the aliquot of lemon juices added was not enough to induce a difference in consumers taste.

Table 2. Statistical parameters [3].

	Jam	Jelly
α	0.05	0.2
β	0.3	0.1
pd	40%	40%

¹ α = I species statistic error; β = II species statistic error; pd = judges’ proportion who distinguished between products.

4. Conclusions

In conclusion, it is possible to state that locust bean gum (LBG, E 410) used as thickening agent in food preparations could be positively utilized in sweet cherry jam recipe, lending a good texture positively perceived by consumers. It’s noteworthy to underline how each ingredient used in jelly preparation, should be adopted in the correct amount to avoid a misuse of money and to generate an appreciation by consumers.

Supplementary Materials: The following are available online at www.mdpi.com/xxx/s1, Table S1: title.

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References

1. Figueroa, L.E.; Genovese, D.B. Fruit jellies enriched with dietary fibre: Development and characterization of a novel functional food product. *LWT Food Sci. Technol.* **2019**, *111*, 423–428.
2. Shinwari, K.J.; Rao, P.S. Stability of bioactive compounds in fruit jam and jelly during processing and storage: A review. *Trends Food Sci. Technol.* **2018**, *75*, 181–193.
3. UNI ISO 5495.2001
4. Pagliarini, E. *Valutazione Sensoriale*; Hoepli Milano: Milano, Italy, 2014.
5. Rizzo, V.; Tomaselli, F.; Gentile, A.; La Malfa, S.; Maccarone, E. Rheological Properties and Sugar Composition of Locust Bean Gum from Different Carob Varieties (*Ceratonia siliqua* L.). *J Agric. Food Chem.* **2004**, *52*, 7925–7930.