

## EVALUATION OF THE AROMA AND SENSORY CHARACTERISTICS OF PLUM DISTILLATES OBTAINED IN THE ARGES REGION

### DETERMINAREA CARACTERISTICILOR SENZORIALE ALE UNOR PROBE DE DISTILAT DE PRUNE OBȚINUTE ÎN REGIUNEA BAZINULUI POMICOL ARGES

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**Abstract.** Plum distillate is an alcoholic drink obtained by the fermentation and distillation of plums. Its quality is determined by many factors, such as climate characteristics, soil, plum varieties and technological process. The aim of this study was to analyze the sensorial characteristics of plum distillate samples produced through an authentic manufacturing process in Argeș region, Romania (purchased from different producers). A total of 26 samples were analyzed. A sensory analysis was done by qualified professional tasters, according to the method of positive scoring. Each sample was marked from 0 to 5, the average representing the intensity level of each item. The analyzed characteristics may constitute a basis for the identification and authentication of the quality of these products.

**Keywords:** plum distillates, brandy, sensorial analysis

**Rezumat.** Țuica este o băutură alcoolică obținută prin distilarea prunelor fermentate. Calitatea acesteia este dată de diverși factori, precum condiții climatice, caracteristicile solului, soiul și varietatea prunelor utilizate și tehnologia folosită în procesul de fabricație. Această lucrare își propune analizarea caracteristicilor senzoriale ale unor probe de țuică obținute din soiuri autentice din regiunea bazinului pomicol din județul Argeș. Probele au fost achiziționate de la producători diferiți. În vederea realizării analizei senzoriale, au participat la degustare persoane specializate în acest domeniu, probele au fost notate cu note de la 0 la 5, media acestora reprezentând nivelul de intensitate al fiecărui marker urmărit. Caracteristicile înregistrate în urma analizelor efectuate pot constitui o bază pentru identificarea și autentificarea calității acestor produse.

**Cuvinte cheie:** distilat de prune, țuică, analiză senzorială.

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**INTRODUCTION**

Among the wide selection of fruit distillate products, plum distillate, called *țuică*, is the most popular distillate in Romanian regions. It is mainly made in small production batches, following a traditional process.

This beverage is quite well known in Central Europe (Hungary, Poland, Czech Republic, Slovakia), and similar plum brandies are produced in Germany, Austria (*Zwetschgenwasser*), France (*eau de vie de prune*), and Switzerland (*Pflümli wasser*). Poland also has a long tradition of making *slivovitz* (Satora and Tuszyński, 2008).

Distillation is the separation process involving the passage of a liquid mixture in the vapor state by boiling, followed by the condensation of the obtained vapors. It is, therefore, a physical process that occurs in two stages: the transition from the liquid state to a gaseous state, followed by obtaining a distillate from the gaseous state (Dabija, 2002).

The distillates obtained from fruit products represent a secular tradition. Distilled alcoholic beverages contain an amount of ethyl alcohol ranging from 20-55% vol., alcohol obtained after the distillation process of agricultural products which have been previously subjected to alcoholic fermentation. Due to the wide range of fermentable plant products and production technologies, distillates are found in a wide range of varieties that have specific organoleptic characteristics (Gavrilescu, 1998).

The plum distillate has an alcohol content of 24 to 52% vol. and is obtained by the distillation of a marc which may come from different varieties or local plum populations. The quality of these beverages largely depends on the quality of the raw material used for fermentation and distillation (Satora *et al.*, 2017).

The preparation of fruit distillates (especially plums) has an old tradition in Romania and is still the main activity for many inhabitants from different fruit tree growing areas.

Fruit growing was established in 1971 in Argeș County, considered the first in the country regarding the number of fruit trees (8.5% of the country's stock) and fruit production (8.7% of the total), while the plum orchards and the trade with plum brandy brought fame to the county. The favorable geographical environment has provided very good conditions for the adaptation of some species and varieties that have become traditional to this area (Pomohaci, 2002).

From the analysis of the present situation of orchards surfaces in Argeș county, the dominance of plum and apple species can be observed (cca. 90%) and poor representation of other species. Thus, out of a total of 20151 ha, the plum species occupy the area of 13609 ha (64.9%), while the apple orchards reach 5.471 ha, which represents 27.2% of the total orchards. Strong fragmentation of the relief, approximately north-south orientation of the hills, but also their position at the foot of the Southern Carpathians (functioning as a protective wall that prevents the appearance of cold atmospheric currents), are factors that favor the intensive cultivation of fruit trees. The orchards ascend up

to 800 m altitude, but there are also cases when they are met at over 900 m (Băcăuanu, 1992).

## MATERIAL AND METHOD

Production of plum brandy can be roughly divided into phases: selection of raw material and fermentation, distillation, and in some cases, maturation and stabilization/fining of the product.

The raw material used to obtain the plum distillates was represented by the fruits harvested at full maturity, of the *Prunus domestica* variety.

The fermentation of crushed fruits was carried out at approximately 19°C. Monitoring of fermentation was performed every day and fermentation lasted until the concentration of sugar decreased to 4°Brix taking care to avoid other fermentations (like acetic fermentation, lactic fermentation). Fermentation was done in oak barrels and the process was carried out for about 35 days. For the distillation of plum beverages, a simple copper distiller with a deflector and a stirrer was used. Water was used in the condenser as cooling agent. All samples were aged in oak barrels for one year, except for the 2005 sample that has been stored in the barrel for 12 years.

The organoleptic analysis aimed at highlighting the quality characteristics of the distillates and was realized by qualified professional tasters with experience in tasting techniques. The evaluation took place in the tasting room belonging to the "Ion Ionescu de la Brad" University of Agricultural Sciences and Veterinary Medicine Iași. They awarded points from 0 to 5, depending on the intensity of each flavor.

## RESULTS AND DISCUSSIONS

In this article, the results of the organoleptic analysis for 10 of the 26 samples are presented. 9 samples were obtained in 2016 and the last one is from 2005 (the oldest of the samples), being used as a control sample. In table 1, one can see the description of the analysed samples.

Table 1

Experimental distillate variants taken into analysis

V1	Topoloveni village, Argeș, 2016
V2	Costești village, Argeș, 2016
V3	Valea Vîlsamului village, Argeș, 2016
V4	Domnești village, Argeș, 2016
V5	Morărești village, Argeș <sup>1</sup> , 2016
V6	Morărești village, Argeș <sup>2</sup> , 2016
V7	Morărești village, Argeș <sup>3</sup> , 2016
V8	Morărești village, extra, Argeș, 2016
V9	Morărești village, Argeș <sup>4</sup> , 2016
V10	Morărești village, Argeș, 2005

Generally, plum distillate is characterized by an intense fruit aroma as well as often a typical pungent flavor owing to its production in an empirical manner. The flavor of alcoholic beverages is affected by a very large number of compounds (acids, higher alcohols, esters and carbonyl compounds) present in small amounts but with a large influence on the bouquet.

The results of the tasting (which was done with the help of qualified professional tasters, according to the method of positive scoring, based on sensorial experiences) were centralized and are presented in table 2.

As a result of the organoleptic analyses of the 10 samples, it was found that the oldest sample (V10-Morărești Argeș 2005), which was aged 12 years before being analyzed, recorded the richest sensory profile (the highest average values). This proves that oak wood has had a positive influence on the organoleptic profile of the distillate, giving to the final product a stronger structure, greater consistency and higher persistency. All of these markers are indices that confirm the quality of distillates. Time and storage conditions also have a significant influence on the quality of the products. As the distillate has been stored in oak barrels, chemical reactions have taken place, such as: micro-oxygenation (favored by small amounts of oxygen entering the mass of the product through the oak stave), alcohol evaporations, exchanges of compounds between stave and distillate, all of which result in the enrichment of V10 from a chemical point of view, enrichment that was also reflected in the three indices: body, structure and persistence.

Of the 9 samples obtained in 2016, one can also note: V3 from the point of view of fruitfulness (strong aromas of plums and pears have been identified); in case of sample V8 the exotic aromas were strongly felt.

The experimental sample V7 showed stronger woody notes, compared to the other variants obtained in the same year, which may indicate that the barrel used to keep the distillate for aging is at first use, or the degree of wood burning is more intense. This fact is also proven by high values of the parameters: body, structure and persistency of this sample compared to the samples obtained in the same year.

As a result of tasting - from the category of unwanted flavors - animal and pharmaceutical notes were identified in all analyzed samples, but these markers recorded very low averages, so their influence was minimal. Also, we can observe that the sample from 2005 recorded the smallest values regarding these two parameters. So, the positive effects of the long aging process into oak barrels on the evolution of the organoleptic characteristics are again confirmed.

Tablă 2

Results of the of the organoleptic analysis

No	Marker	Average (the intensity of the marker)									
		V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
1	FRUITY (ripe-plum, pear, apricot)	3	3.17	4.33	3.17	3.5	3.17	3.83	3.2	3.8	3.67
2	HERBACEOUS (hay, mint)	1	0.5	1	1.5	1.5	2	1.33	1.6	1	2.17
3	MINERAL (earth, rock)	0.67	0.83	0.67	1	0.5	1.33	0.83	1	0.8	0.67
4	FLORAL (roses, iris)	2	1.83	2.83	1.83	2.33	1.5	3	2.6	1.8	2.5
5	WOODY (oak, coffee, tobacco)	1.33	1.83	1.83	1.5	1.33	1	2.83	2.8	2.4	2.83
6	BALSAMIC (resin, pine)	1.17	1	0.83	1.5	1.67	1.17	1.33	1.4	2	1.5
7	CHEMICAL (pharmaceutical notes)	1.5	1.83	1.17	3.33	2.83	2	1.67	1.8	2.8	1
8	ANIMAL (leather, musk)	0	0.33	0	0.17	0.17	0.33	0.33	1	0.8	0.17
9	ACID	1.67	1.33	1.33	2.17	2	0.83	1.33	1.4	1.2	2
10	SWEET	2.17	1.83	2.33	1.33	1.5	1.83	2	2.4	2.2	2.17
11	BITTER	0.67	0.50	1.67	0.83	0.83	1	0.83	1	1.4	0.67
12	ONCTUOSITY	1.67	1.83	2.5	2.33	2	1.83	2.67	2.6	3	2.83
13	ASTRINGENCY	1.33	1.33	1.33	2.17	2.17	1.33	2	1.8	1.6	1.67
14	CHEMICAL HEAT	2.17	2.5	1.67	2	2.33	2.33	2.33	2.6	3.4	2.67
15	BODY	2.33	2.5	2.5	2.33	2	2.5	3.2	2.8	3	3.33
16	STRUCTURE	2.33	2.5	3.5	2.17	2.67	3.17	3.83	3.6	3.2	4.17
17	PERSISTENCY	2.17	3	3	2.67	3.33	2.67	3.83	3.6	3.6	4

## CONCLUSIONS

1. The oldest sample (V10-Morărești Argeș 2005), which was aged 12 years before being analyzed, recorded the richest sensory profile (the highest averages values), so the aging process influenced positively the sensorial profile of this sample.

2. Of the 9 samples obtained in 2016, one can also note: V3 from the point of view of fruitfulness (strong aromas of plums and pears have been identified); in case of sample V8 the exotic aromas were strongly felt and the experimental sample V7 showed stronger woody notes, compared to the other variants obtained in the same year.

3. As a result of tasting - from the category of unwanted flavors - animal and pharmaceutical notes were identified in all analyzed samples, but these markers recorded very low averages, so their influence was not considered a problem.

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