

STUDY REGARDING CHEMICAL COMPOSITION OF “PALINCA” PLUM DISTILLATE FROM CODRU COUNTRY REGION

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Abstract

The research was carried out in the Country Codru Region from limit between Maramureș and Satu Mare counties. There was analysed 8 samples of distillates (palinca) from 3 villages Asuaju de Jos. Băița de sub Codru and Ardușat. All samples were collected directed from traditional distillery. Fізico-Chemical analyses followed alcohol concentration; relative density; total acidity; sulphur dioxide content. methanol and furfurole and total content in Ca. Mg. Fe. Zn. Cu. Ni. Co. K. Cd and Na. Results concluded that traditional “palinca” correspond with legislation regarding chemical composition. methanol was identified in one sample and furfurole was absent in all the samples. concentration in minerals was similar at all the samples and depends by the quality of the water used in technological process.

Key words: palinca. alcohol concentration. mineral concentration. methanol. furfurole. total acidity -

INTRODUCTION

From the beginnings of the knowledge of distillation until the last century. only the alembic was used for the distillation. to which some improvements were made. but in which the heating was done with direct fire.

Nowadays. in the brandy and spirit manufacturing industry. modern lines and distillation columns have been reached. where the quality of the production obtained. the yield. the cost price. as well as the manufacturing speed are superior to those of the stills with direct fire. which are on the way to total replacement. (Pop and Laslo 2012).

Although the number of distilleries and their degree of use decreased after 1989. at the same time. an intensification of the production of brandy and natural brandies in households in direct-fired boilers is noticeable. A situation of this kind can be found in the fruit-growing area of

northwestern Transylvania. where the number of boilers with direct fire has almost doubled in Sălaj. Maramureș and Satu Mare counties. At the end of 1996 in Satu Mare county there 354 direct fire boilers and 2 modern distilleries (Zetea and Bran); in Maramureș county there 486 direct fire boilers. 2 steam distillery at Seini and Buciumi and 3 spirit factories at Berința. Seini and Lăpușel; in Sălaj county there 72 direct fire boilers. 2 modern distillery at Zalău and Almaș and one spirit factory at Zalău.

Together. with plum distillate which is a national beverage called țuică. these fruit distillates have not been studied and there are not chemical data for many of these. An important feature of fruit distillates is the flavor of the fruit from which it originates. The most important compounds in fruit distillates that influence flavour are higher alcohols and esters along with terpenes. (Stoica et al.. 2019).

Palinca is obtained from the distillation of the fermented plum mash. Young plum distillates are colourless and in the aroma phase they are characterized by sensory attributes such as floral, fruity, herbaceous, ensilage and heads, with astringent and alcoholic notes in taste. After the aging process, sensory characteristics are removed and the mature distillate shows different sensory qualities in colour (yellow-golden, orange-amber) and new attributes in flavour and aroma. (Stoica and Giurgiulescu, 2016).

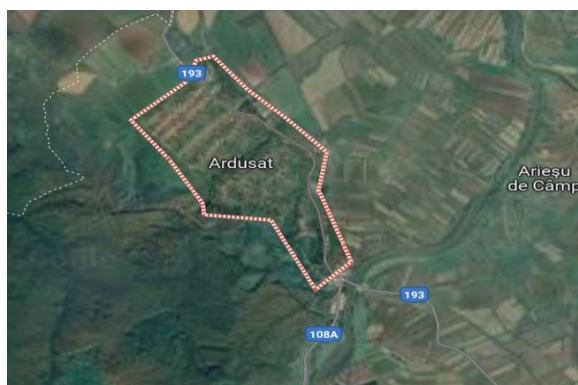
The main goal of this study was to compare different type of distillates obtained in 3 region of Codru County Region an area at the confluence of Maramureș and Satu Mare counties, of

palinca was obtained by traditional process of distillation in cooper alembic.

MATERIALS AND METHODS

To obtain palinca plum distillate was used mixtures of plum varieties (Stanley, Anna Spath and Vânăț românesc) from 3 plum orchards: Asuajul de Jos, Băița de sub Codru and Ardușat. All the samples of palinca has been obtaining by traditional method in cooper alembic. The harvest regions and tradition distilleries are described below.

Ardușat traditional distillery with 40 years production activity deserve more than 20 neighbour villages. Băița de sub Codru distillery is located at the base of a hill near the river Băița. Asuaj traditional distillery with 30 years production activity used 2 steam tanks with 500 l and 700 l capacity



a)



b)

Figure 1. a) Plums collected zone b) Ardușat Traditional distillery.



a)



b)

Figure 2. a) Plums collected zone b) Băița Traditional distillery.



Figure 3. a) Plums collected zone b) Asuaj Traditional distillery.

RESULTS AND DISCUSSIONS

Table 1. Samples codification

Code	Zone/Production year
P1	Ardusat 2014
P2	Ardusat 2011
P3	Ardusat 2013
P4	Băița 1988
P5	Băița 2014
P6	Băița 2010
P7	Asuaj 1991
P8	Asuaj 2014

For each sample of distillate was determinate in triplicate ethanol. methanol. furfural. total acidity. mineral content. and

sulphur dioxide. Ethanol was determinate by pycnometer method. total acidity by titrimetric method. sulphure dioxide content by iodometry. methanol presence by Schiff-Elvove method. furfural by colometry and mineral content with Perkin Elmer Analyst 800 atomic absorption.

Alcoholic concentration varied from sample P2 with high alcohol concentration to P4 with low alcohol concentration as result from table 2. During the aging process the palinca distillate record alcohol decrease in correspondence with the production year. All the samples present the alcoholic concentration in limits regulation by Standard 4500-54.

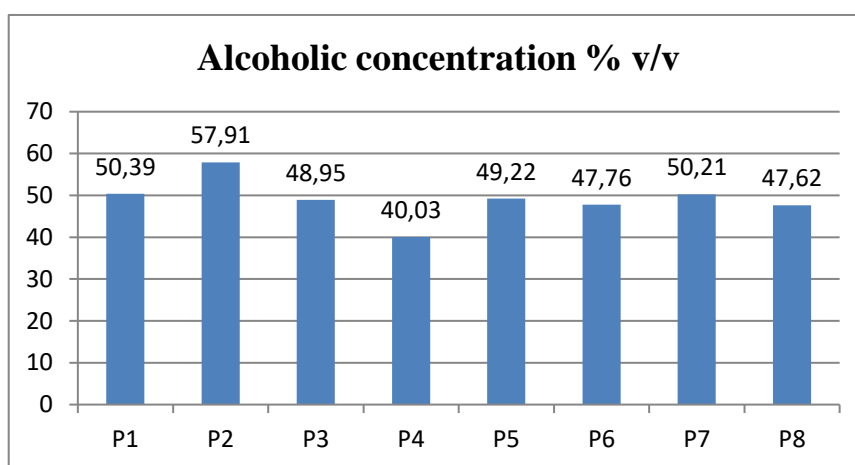


Figure 4. Alcoholic concentration % v/v

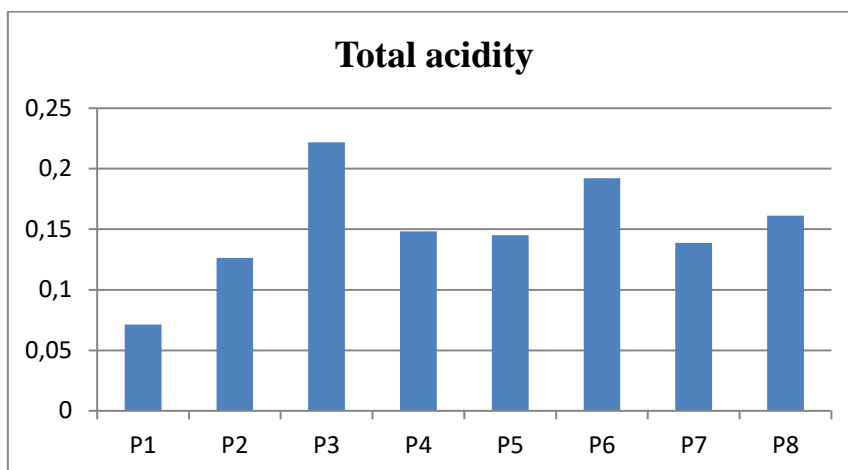


Figure 5. Total acidity in g/100 ml acetic acid

Total acidity records high values at the samples P3 and P6 and low values at samples P1 and P7. Total acidity are influenced by ageing period as a result of keeping of “palinca” distillates in wood vessels. If the distillates are keeping in glass recipients. the oxidation process are

blocked. and the content of total acidity remain constant during the ageing period. Anyway. for the samples the content in total acidity was recorded in normal limits in according with standard regulation SR 184-5: 1997.



Figure 6. Presence of methanol

Regarding colorimetric analyses used to identify the presence of SO₂, methanol and furfural. only in the sample P4 it was identified the methanol. In all of the other samples from P1 to P8 the presence of furfural and sulphur dioxide was not identified as long as the methanol. The presence of methanol by colorimetric

method based on Schiff-Elvove reactive and apparition of violet colour in sample P4 as shown in figure 6 denotes a wrong separation of phases during the distillation process. The presence of the first fraction called “frunte” into the distillation liquid indicate the methanol.

Table 2. Mineral content of samples analysed

mg/l	Cu	Fe	Cd	Mg	Ca	Na	K	Ni	Zn	Co
P1	5.731	0.088	0.095	1.150	5.009	5.120	0.465	0.066	0.185	0.000
P2	4.434	0.068	0.093	3.650	2.340	6.110	0.513	0.031	0.051	0.000
P3	2.014	0.020	0.100	0.020	1.096	0.105	0.406	0.287	0.010	0.000
P4	5.127	0.061	0.121	0.106	2.288	1.436	1.416	0.243	0.107	0.000
P5	2.947	0.116	0.103	0.041	1.344	0.106	0.089	0.085	0.337	0.000
P6	3.691	0.335	0.123	1.242	4.514	2.078	0.289	0.049	0.044	0.000
P7	2.366	0.000	0.189	0.286	2.345	0.337	0.324	0.070	0.028	0.000
P8	2.786	0.176	0.107	0.012	1.007	0.544	0.434	0.122	0.000	0.000

Mineral content records different values for all the samples depending on the type of metal analysed. All the samples present in chemical composition Cu due the recipients used in traditional distillation process and technological process. At 2 samples P1 and P4 was exceed the permitted limit by law regulation of 5mg/l, but the exceed was not so high.

Fe concentration in all the samples record similar values from total absence at sample P7 to high content in sample P6. Usually, technological practice could enrich the distillates with heavy metals on the one had as a result of distillation tank materials Mn, Ni, Fe, Sn, Pb and on the other hand as a result of long utilization of the same tank recipient in contact with acid liquids such as fermented fruits liquids. Cd an Ni records low values in all the samples. Metals that come from soil Na. Mg, Ca and K as microelements present similar values in all of the samples. These metals could be used to identify the soil print and in a further investigation can be used in a possible traceability of adulteration. Samples with the same provenience need to present the same soil print in chemical analyses.

Co was absent in all the samples analysed. Zn an element with essential role in plant physiology record the high values in sample P1, P4 and P5 and in rest similar values at all of the samples.

CONCLUSIONS

From chemical point of view all the samples of "palinca" correspond to the national regulation. In general distillate obtained from plum fruits do not correspond for the consume if contains suspensions or sediments, when it tastes and smells sour, smoky, moldy or other foreign tastes and smells.

The alcohol concentration values were within the allowed limits, the highest value being the T2 sample with 57.91% vol. alc. The total acidity determined oscillated between 0.07144 and 0.22186, in according within the legal limits (maximum 0.4 g/100 ml).

Another analysis carried out is the determination of furfural, which was absent from the composition of the brandy, this being also not allowed. Furfurol arises in the distillate through the degradation of pentoses, appearing at the end of the "middle" fraction and the beginning of the "tail" fraction. Condensation reactions with the tannins can also take place, explaining the variations in the furfural content during the aging of the distillate.

Sulphur dioxide was not recorded in all of the samples take it in analyse.

Following the identification of methanol, it is present in only one sample to be analysed, with origin in Maramureş area, specifically Băița, produced in 1988. The presence of methanol in palinca is very dangerous, because in high amounts is

toxic and can cause blindness of the consumers by repeated consume.

Mineral contents are influenced by technological practice and soil chemistry. In all the samples Cu was identified with 2 samples over the legal limit. Fe, Cd, Ni was reported in normal limits. Cd was totally absent in all the samples.

Distillate obtained by traditional practice present a good quality but the persons engaged in distillation need to pay more attention to the distillation process to prevent increase of heavy metals in distillates.

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