Sensory evaluation of Sljivovica quality is a demanding and responsible task. To carry out the evaluation satisfactorily, certain specific conditions must be fulfilled. To clearly define all necessary sensory characteristics of Sljivovica, an official vocabulary of professional terms and concepts should be established in both theory and practice. The development of an official vocabulary is becoming an imperative, especially when it is evident that subjectively uttered words and concepts and their use can lead to lack of understanding or misunderstanding. The motivation for initiating work on such vocabulary derives from the fact that all renowned world drinks like Cognac, Calvados, Whisky etc have had it for a long time, while Serbian Sljivovica has never had it. Due to the lack of an official professional vocabulary, and for the needs of the present paper, the author has taken liberty to present to the research and professional public the vocabulary he has compiled for sensory description of basic parameters of plum brandy Sljivovica quality. The vocabulary comes from personal experience and participation in numerous official commissions for evaluating the quality of alcoholic drinks and wines in Yugoslavia. The proposed terms for the plum brandy Sljivovica vocabulary or dictionary should be taken as a pioneering attempt and initiative for compiling a more comprehensive Serbian plum brandy dictionary. The author strongly believes that a committee of experts would be able to fulfill the task in the best possible way.

In Yugoslavia, plum has always been a national fruit crop, while plum brandy Sljivovica has been for decades a worldwide recognizable Yugoslav symbol. Therefore, no wonder that in all best known encyclopedias (Britannica, Larousse etc) Yugoslavia is mentioned and memorized in the world heritage, apart from Czar Dušan and his famous 1354 Codex, Nikola Tesla, Ivo Andrić, Ivan Meštrović, after its plum fruit crop and far and wide famous plum brandy

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Sljivovica. For years, our country has been top ranked for the amount and quality of this fruit crop yield and today we are still the world’s champion in plum brandy Sljivovica production. Its lavish smell, refined aroma and extraordinary drinkability has always easily found way to customers with a subtle taste and ability to recognize real, top quality.

When talking about some product, no matter whether it is a raw material or intermediates in some stages of technological process, or an end-product, we must always have in mind some characteristics or properties which determine its quality. The quality of a product is an important factor of economy, social or personal standard. Over the past years there has been a growing interest of the world public in food quality which plays a prominent role in human health. The term food can be hardly applied to the plum brandy Sljivovica, however, due to its massive consumption and effects on human health in case of inadequate excess consumption, over the past years numerous consultative meetings and research-professional discussions have been devoted to its quality. The starting point in defining the quality of plum brandy Sljivovica are new findings in the domain of instrument and sensory analysis. The word quality derives from Latin *qualitas* which means a characteristic or an attribute indicating bad, average or good property of some material. To measure the quality of some strong alcoholic drink, of plum brandy Sljivovica as well, and in addition to score it, is extremely difficult, considering the fact that the term quality is complex and multi-layered. The overall quality of plum brandy Sljivovica is a sum of individual qualities, whose perception and exact determination is the only proper way to evaluate it.

The complexity of Sljivovica quality, i.e. the share of a large number of factors in developing it, requires diverse methods to determine it. Along with recognizing certain specifics (methods for Sljivovica analysis), the system of overall quality control, as shown in the mentioned picture, can be used for Sljivovica quality control. It consists of laboratory methods, specific for each group and type of product, and sensory or organoleptic evaluation methods. How successful a certain laboratory method will be depends on a number of factors: possession and use of an accurate measuring instrument, appropriate methods of analysis which must be reliable, reproductive and comparable, and a well-trained performer i.e. analyst. Sensory evaluation method is considered reliable and objective if it is based upon valid scientific principles, if prescribed conditions are observed in carrying it out, and if assessors are subjected to their sensory perceptions and reproduction check up by a variety of tests. If the selection of assessors is done in a prescribed manner and adequate working conditions are provided, the objectivity of evaluation should not raise doubts.

The results of sensory analysis together with the results of laboratory experiments may be used to make a final judgement on the quality of plum brandy Sljivovica only after their processing by adequate mathematical-statistical methods. The quality of Sljivovica is a complex concept. In addition to its
chemical composition, the utmost importance is attributed to its sensory characteristics as one of the most important factors of quality. The response to various external stimulations reflects itself in different perceptions of different individuals. That is why such individual opinions about the perceived characteristics of Sljivovica must fall into the category of subjective evaluation. However, if organoleptic evaluation of product properties is done systematically based upon exact, scientific methods, we could then talk about the application of a sensory analysis.

There are very many definitions of sensory analysis, but the most appropriate seems to be the one as presented by the International standard ISO 5492 which states that sensory analysis is "the examination of the product organoleptic properties by means of sensory organs". Talking about Sljivovica, the phrase sensory analysis implies the description or evaluation of its properties by means of senses. The basic prerequisites for successful sensory analysis application and its verification as a scientific method are certainly the use of unique concepts and methods as well as trained and reliable assessors. Distinction should be made between organoleptic analysis, tasting, testing, and evaluation of Sljivovica, on the one hand, and sensory analysis, on the other hand. In sensory analysis, man is "a measuring instrument". He must be educated and able to totally eliminate his own preferences i.e. must be completely neutral and must use his senses independently. With an organoleptic analyst, the quality evaluation overlaps with his liking, his sensory abilities being impossible to examine. In contrast, a sensory analyst measures by employing his senses, uses exact methods, evaluates obtained results statistically, attends courses and takes tests, and is frequently subjected to sensory abilities check up. Sensory analysis comprises biometrics, knowledge of psychology and physiology of sensory organs. It is only then that sensory analysis can be talked about as a scientific discipline. Great attention is devoted to future alcoholic drinks assessor's education, selection and advanced training. The task of a selected and well trained assessor is to determine the plum brandy quality by applying objective criteria. He must be willing to reproduce his evaluation at any time. It is not realistic to expect a randomly selected person, without any previous preparation and testing, to produce valid results for quality evaluation. Such results can serve only as a guide. Therefore, distinction should be made between organoleptic quality evaluation of an uneducated and untrained layman and that of a sensory analyst. Untrained organoleptic analyst mixes up quality score and personal liking, without intention to have his abilities checked up, thus differing from educated analyst who uses exact methods and checks obtained results statistically.

As distinguished from degustation which is only the technique of plum brandy Sljivovica tasting (how to hold a glass, technique of smelling and swallowing, serving sequence, sample evaluation etc), sensory analysis implies
presence and participation of a trained assessor, who, being a measuring instrument, will provide for good repeatability of results, possesses a low threshold of sensory detection, high threshold of saturation, high discrimination ability for colors, aromas and flavors. In addition to physiological predispositions, a good assessor must be highly motivated for work, learning and evaluating, interested in improving his sensory organs acuity, is not susceptible to frequent colds, and provides for good repeatability of results.

With reference to training i.e. qualification level, within the domain of some product sensory evaluation, there are: laymen, laymen without training, assessors, experts and sensory analysts.

**Laymen** are persons expressing their judgement about some product quality without being previously acquainted with the examination task. Their capability and aptitude for doing this job is not tested.

**Laymen without training** are laymen who get acquainted beforehand with the task and method of evaluation.

**Assessors** are persons who have proved their capabilities and aptitudes for product examining and evaluating along with previous compulsory education and getting acquainted with the fundamentals of a certain product’s manufacturing technology.

**Experts** are persons who have fulfilled conditions for becoming assessors, are educated and trained in the sphere of a particular product, are well grounded in the technology of the product, possess related knowledge about technology of a certain product, are experienced and perform evaluation every day.

**Sensory analysts** are persons who are thoroughly acquainted with sensory theory and practice and are qualified assessors. In addition, they are trained to be group leaders and train others for sensory analysis, so they are trained for evaluation managers.

Candidates for evaluation committee members are tested, so that a reliable group of suitable assessors can be formed. The first stage of testing consists of examining the ability for distinguishing between nuances of basic types of taste: salty, sweet, sour and bitter. Methods applied are standard: pair testing, duo-trio testing, stimulus-intensity ranking, triangle method etc. Further activity comprises methods for checking a border threshold of sensory discrimination between plum brandy’s various properties. This primarily refers to establishing the so called absolute sensitivity threshold (the ability to respond to the lowest possible concentration, least possible differences in concentration, and to discriminate between lowest concentrations of certain ingredients). It should be pointed out that a taster who can discriminate well need not be a successful quality assessor, considering the complexity of the concept of quality in various types of products.

Sensory evaluation of Sljivovica quality is a demanding and responsible task. To carry out the evaluation satisfactorily, certain specific conditions must be
fulfilled. The number of evaluation committee members has to be odd (3, 5, 7 etc). A controlled ambient in the evaluating room is required (air-conditioned atmosphere, air temperature 18-20°C, humidity 60-70%, good and sufficient daylight, peace and quietness, isolation from foreign, strong and unpleasant smells, smoking prohibition etc). Work places for assessors should be located in special booths. If booths can not be provided for, assessors should sit one behind the other at a proper distance. Evaluation is fully independent and anonymous (samples are coded). In order to revitalize senses, short or longer breaks are practiced during the evaluation process. Water, mineral water or milk is most frequently taken to neutralize the senses. Food consumption should be done prior to the initiation of evaluation or during the break. Neutral cheese or caciocavallo cheese, saltless ham, apple slices or bread can be eaten. The OIV recommends that the number of samples to be evaluated must not exceed 30 per day. Neutral, colorless, and young plum brandies are evaluated first and after that those colored, older (more mature), and “heavier” i.e. of more complex flavor.

The investigations by Larmondova (1973) evidenced that women are more sensitive to smells compared to men. However, women possess higher variability in sensory perception quality. The habit of heavy smoking affects the quality of evaluating, while moderate smoking does not, on condition that two hours prior to evaluation start no cigarette has been smoked. Sensory acuity to smell and taste declines with age, however, experience and wisdom expand. Glasses to be used for plum brandy quality evaluation must be of colorless thin glass, tulip-like shape. Evaluation can also be performed using glasses prescribed by INAO for evaluating wines and strong alcoholic drinks.

Evaluation is most often conducted on a point-type system, where the following quality parameters are scored: color, clearness, typicality, aroma, and flavor. The point scale per parameter ranges as follows: color 0-1, clearness 0-1, typicality 0-2, aroma 0-6 and flavor 0-10. The maximal number of points a plum brandy sample under evaluation can score is 20. Also, medals are awarded at very many fairs: a medal is not awarded if the score is 14.00, but if it ranges from 14.01-16.00 a bronze medal (BM) is won, from 16.01-18.00 a silver medal (SM), and from 18.01-20.00 a gold medal (GM). Within the framework of a gold medal award, special recognition in the form of a great gold medal (GGM) is granted to those samples having scored more than 18.20 points. In the post years, the evaluation of alcoholic drinks quality has been done according to the OIV degustation list. Descriptive quality evaluation of plum brandy Sljivovica requires as much objective expression of sensory perception as possible, where assessors’ training and experience largely influences the level of objective evaluation. To clearly define all necessary sensory characteristics of Sljivovica, an official vocabulary of professional terms and concepts should be established in both theory and practice. The aim of that specific terminology would be to point out in a linguistically clear manner all that has to do with the quality of plum brandy. It is neither easy nor simple to describe all characteristics relevant to a single plum
brandy. It should be stressed that even the most comprehensive vocabulary could not comprise all peculiarities and diversities present in describing Sljivovica sensory characteristics. Hence, perception and composition of sensations in Sljivovica evaluation is a very complex and responsible task. The development of an official vocabulary is becoming an imperative, especially when it is evident that subjectively uttered words and concepts and their use can lead to lack of understanding or misunderstanding. Terms and concepts to be found in the vocabulary should be clear, free from ambiguity, exact, applicable in practice and grounded on science.

The motivation for initiating work on such vocabulary derives from the fact that all renowned world drinks like Cognac, Calvados, Whisky etc have had it for a long time, while Serbian Sljivovica has never had it. It is the author’s belief that the establishment of such vocabulary will remedy a long lasting wrong that Serbian people have been doing in various ways to their national alcoholic drink. Due to the lack of an official professional vocabulary, and for the needs of the present paper, the author has taken liberty to present to the research and professional public the vocabulary he has compiled for sensory description of basic parameters of plum brandy Sljivovica quality. The vocabulary comes from personal experience and participation in numerous official commissions for evaluating the quality of alcoholic drinks and wines in Yugoslavia.

To describe sensory characteristics and typicality of a single Sljivovica maturing in an oak vessel for a long period of time is neither easy nor simple. The top quality Sljivovica implies harmonious action of color, clearness, and distinctive smell, full and harmonious flavor along with appropriate positive co-action of aroma as well as pleasing and long lasting persistence in a residual portion of flavor.

Clearness is one of the parameters of Sljivovica sensory quality. It can be stated that there is synergism with the purity and color nuance, which contributes to the overall visual liking of Sljivovica. Thus, concerning turbidity and clearness, Sljivovica can be: strikingly turbid with precipitate, extremely turbid, turbid, haze-like turbid, opalescent, slightly opalescent, clear, and crystal clear.

Color is an important parameter of Sljivovica quality and correlates with the perception whether or not it has been ageing for a certain period of time in some wooden vessel. Since it is color, apart from clearness, that forms the assessor’s initial sensory perception of quality or non-quality, this parameter plays a prominent role with a professional assessor.

Concerning color, Sljivovica can be: colorless, anemic (pale, markedly light colored with all possible nuances), straw-like yellow (strawy), lemon yellow, light yellow (pale yellow), yellow, ochre yellow, yellow greenish, golden yellow (ducat yellow), light amber-colored, amber-colored, dark amber-colored, greenish, green, greenish yellow, chlorophyll-like green (the color of grass), yellowish green, olive-green (the color of olive oil), petroleum green, brick-colored, reddish, brown, and sour cherry-colored.
**Typicality** as a quality parameter of strong alcoholic drinks was introduced several years ago in order to clearly differentiate specific and distinctive characteristics synonymous for certain categories of strong alcoholic drinks, concerning the diversity of technological processes of various types and groups of alcoholic drinks production. Sljivovica can be non-typical (non-characteristic) and typical (characteristic).

**Aroma** is certainly one of the most prominent parameters directly influencing the final judgment on Sljivovica quality. According to its origin and time of emergence, the aroma complex of Sljivovica can be arranged into four groups: 1. primary aromatics, 2. secondary aromatics, 3. tertiary aromatics and 4. quaternary aromatics.

The basic aroma of Sljivovica and its most striking peculiarity derives from the so called primary aromatics or substances (the highest content is found in fruit skins), esters and terpenic alcohols being in highest contents. Since Sljivovica quality is most evaluated for its aroma naturalness, intensity and purity, attention should be especially devoted to aromatics’ location, nature and behavior during processing so as to prevent their loss, change and degradation, and pass into a distillate in their highest content.

Primary aroma is supplemented by secondary aromatics developed during alcoholic fermentation and keeping of fermented fruit pomace until distillation starts. In addition to other factors, the agents of alcoholic fermentation (spontaneous microflora or selected strains) and conditions of fermentation play a prominent role too.

Tertiary aromatics develop during fermentation and how rapidly they will pass into a distillate depends on a multitude of factors, the most important being the boiling point of each component in a mixture, type of a distillation device, solubility of some admixtures, regime and method of distillation, and interaction between some components of alcohol-water mixture.

The aroma complex of plum brandy Sljivovica is completed by the so called quaternary aromatics developing during distillate ageing in a wooden, most often oak, vessel during a certain period of time. They are also key factors of a specific and highly appreciated old plum brandy bouquet. Since high-quality or top quality Sljivovicas contain all four forms of aromatics, they are considered “heavier” strong alcoholic drinks.

In research and professional literature there are dilemmas and different attitudes to the issue of concepts such as smell, aroma, flavor and bouquet. According to the 1992 ISO No 5492 smell means “organoleptic property received by olfactory organ during smelling of certain volatile substances”. German Institute for Standardization (DIN) defines smell as “olfactory sensation formed during air breathing into the nose”. Aroma is a French word meaning “organoleptic property perceived or received by olfactory organ, of the rear part of nose, during tasting”. The English term for aroma is “smell with the share of
pleasant or comfortable sensation”. The most appropriate definition of aroma would read: “Aroma is the resultant action of smell and taste components of alcoholic drink while it is in the mouth”.

**Flavor** is a joint action of olfactory, gustatory and trigeminal sensations, which is a broader term than the term aroma. According to the ISO standard, flavor is “a complex co-action of olfactory, gustatory and trigeminal sensations occurring during some drink consumption”. Flavor perception is a complex task requiring good knowledge and training. According to the ISO standard, bouquet is “a set of specific olfactory perceptions (traits) providing for some strong alcoholic drink to be described or characterized”. However, the definition formulated by famous Peynaud seems to be more appropriate: “Bouquet is a complex and exuberant smell developed as a result of certain enzymatic and thermal chemical reactions taking place on primary, secondary, tertiary and quaternary aromatics in drinks throughout a longer period of alcoholic drink maturing”.

According to the development level, the smell of plum brandies Sljivovica can be: neutral (anemic), weakly expressed, modest, new (fresh), expressed (developed or mature), intensive, luxurious, aggressive (perfume-like), old, plating-like old (noble), and obsolete (degraded).

According to the level of clearness, the smell of Sljivovica can be: defective (perished), impure and pure.

Concerning the presence of defects and admixtures in plum brandy composition, the smell of Sljivovica can be: ester-like (of varnish, glue, herb), weak brandy-like, burning (sharp, of alcohol), stone-like (of CN anion), toast crust-like, herbaceous (of grass), burnt, smoky (smoke-like), moldy (of mold or dampness), stale (of stagnant marsh), dish-like, plastics-like, rubbery, thoroughly cooked-like, flat (of filter paper), cloth-like (of wet tea-towel), pod-like, earth-like, strange, flat, one-sided, rancid oil-like, sourish, metal-like, oil-like(petroleum), aromatized, strawy (of hay), chemical (acetone, acrolein, H₂S etc), woody (rough), aldehyd (of green) etc.

According to its typical smell, Sljivovica can be: non-typical (non-characteristic) and typical (characteristic).

According to the impression, the smell of Sljivovica can be described as follows: unpleasant (repellent), pleasant (likeable), short (quick-cutting), long (long-lasting), tender, nice, rich, poor, luxurious, complex, velvety, hard (robust), strong (brandy-like), Muscat-like, exuberant, delicate, floral, fruit, refined (noble), vanilla-like, artificial (aromatized), overly sweet (honesweet), specific (distinct), vegetative, chemical etc.

**Taste** is certainly the most important parameter of Sljivovica quality. Due to its complexity, taste should be taken seriously and the terms to be used for describing the sensations produced must be extremely accurate. According to the sensations caused by keeping plum brandy in his mouth, during swallowing it,
and then breathing out after swallowing i.e. in the residual part of the taste, an assessor can evaluate Sljivovica’s taste as follows: empty (weak), semi-empty, medium full, full, markedly full, oil-like, astringent, acrid, acerbic (harsh), non-harmonious, medium harmonious, harmonious (tuneful), completed, light, heavy (tiring), stone-like, weak brandy-like, prickly, herbaceous (of grass), petroleum-like (of oil), soapy, honeysweet, fruit, meadow-like, thoroughly cooked-like, floral, cute (of alcohol), rancid, non-drinkable, moderately drinkable, drinkable, markedly drinkable, fluttery (velvety), velvety, spicy, vanillin-like, plastics-like, metal-like, dry, insipid, sourish, sour, markedly sour, one-sided (not nice), balsam-like, blunt (tired), mild, rubbery, undeveloped, developed, defective, sweetish, burnt, smoky (smoke-like), aldehyd (of green), perfume-like, aromatized, refreshed, thoroughly cooked etc.

The proposed terms for the plum brandy Sljivovica vocabulary or dictionary should be taken as a pioneering attempt and initiative for compiling a more comprehensive Serbian plum brandy dictionary. The author strongly believes that a committee of experts would be able to fulfill the task in the best possible way.

**Conclusion**

In Yugoslavia, plum has always been a national fruit crop, while plum brandy Sljivovica has been for decades a worldwide recognizable Yugoslav symbol. The quality of Sljivovica is a complex concept. In addition to its chemical composition, the utmost importance is attributed to its sensory characteristics as one of the most important factors of quality. Clarity is one of the parameters of Sljivovica sensory quality. Color is an important parameter of Sljivovica quality and correlates with the perception whether or not it has been ageing for a certain period of time in some wooden vessel. Aroma is certainly one of the most prominent parameters directly influencing the final judgment on Sljivovica quality. Taste is certainly the most important parameter of Sljivovica quality. Due to its complexity, taste should be taken seriously and the terms to be used for describing the sensations produced must be extremely accurate. The proposed terms for the plum brandy Sljivovica vocabulary or dictionary should be taken as a pioneering attempt and initiative for compiling a more comprehensive Serbian plum brandy dictionary.

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PRIMENA STRUČNOG VOKABULARA PRI SENZORNOM OČENJIVANJU KVALITETA RAKJE ŠLJIVOVICE

N. Nikićević

Reszime

Senzorno ocenjivanje kvaliteta rakije šljivovice je odgovoran i težak posao. Da bi se ocenjivanje obavilo na zadovoljavajući način, moraju biti ispunjeni određeni specifični uslovi. U cilju jasnog definisanja svih potrebnih senzornih karakteristika šljivovice, neophodno je u teoriji i praksi ustanoviti i utemeljiti jedan zvanični vokabular (rečnik) uskostručnih termina i pojmova. Postojanje jednog zvaničnog (oficijelnog) rečnika postaje imperativ, tim pre ako se ima u vidu činjenica da subjektivno iskazane reči i pojmovi i njihova primena mogu dovesti do nesporazuma i nerazumevanja. Motivacija za iniciranjem jednog ovakvog rečnika leži u činjenici, da za razliku od renomiranih svetskih pića, kao što su konjak, kalvados, viski i td, koji to već odavno imaju, srpska šljivovica nije to nikada a nema ga ni sada. U nedostatku zvaničnog stručnog rečnika za opisivanje senzornih karakteristika šljivovice, za potrebe ovoga rada, autor je uzeo slobodu, da na osnovu ličnog dugogodišnjeg iskustva i učestvovanja u

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Terminology in sensory evaluation of plum brandy

brojnim stručnim zvaničnim komisijama za ocenjivanje kvaliteta alkoholnih pića i vina u Jugoslaviji, pruži naučnoj i stručnoj javnosti na uvid svoj lični rečnik za senzorno opisivanje osnovnih parametara kvaliteta rakije šljivovice. Predložene termine ovog vokabulara ili rečnika rakije šljivovice, treba prihvatiti kao pionirski korak i početnu inicijativu u pravcu formiranja jednog obimnijeg i bogatijeg stručnog rakijarskog rečnika. Autor je uveren da bi konstituisanje jedne zvanične komisije, sastavljene od proverenih naučnih i stručnih eksperata, moglo najuspešnije da odgovori ovom zadatku.