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Evaluation of some physical, chemical and sensorial parameter of turkish coffee trade in the Albanian market

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Abstract: Coffee is a product that is used all over the world because it has a lot of effects on the human body. There are different types of coffee in the market but in the Albanian market, Turkish coffee distinguishes from other types because it is traditional, and is used mainly by housewives. The extraction method is boiling, where mostly all the soluble substances are passed into the cup. We have collected some samples of the Turkish coffee that is in trade in the Albanian market and have evaluated their physical, chemical and sensorial properties. All the Turkish coffee samples are processed in the Albanian region, where are situated some good factories with modern technology. The study aims to evaluate the quality of Turkish coffee that is produced in the Albanian market and for this; we have determined some physical and chemical properties such as humidity, ash, coffee oil, protein, acidity and fibers. We also evaluated the sensorial properties and made a correlation between acidity and sensorial properties. All the data taken for the grinded Turkish coffee have shown that the level of humidity ranged from 1.6 to 3.5%. The ash from 4.01-4.68 %, acidity from 0.7-0.95%, protein from 14-16.7%, carbohydrates from 44.5-69.56%, coffee oil from 13.8-15.76% and fibers from 31.85-34.56%. A correlation was found between the level of acidity and the diagram of sensorial properties.

Keywords: Turkish coffee, Physical and chemical parameters, Sensorial properties, Albania

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1 Introduction

At the very first beginning coffee was offered to the people as food. History says that some shepherds followed the example of their goats to consume the seeds of some plants, in a different way, like chewed, cooked or smoked (Burton, 1961).

Today coffee is one of the commodities that are more largely consumed after water. Coffee consumption is spread all over the world where the USA is the largest consumption, followed by Europe and Japan (Illy and Viani, 2005).

Coffee consumption has soared to a two-decade high as Americans brew up new post-COVID routines, according to National Coffee Association (NCA, 2022). 66% of Americans drink coffee each day, more than any other beverage including tap water.

The pandemic Covid-19, according to National Coffee Association, has not changed how much coffee American drinks or how often, but has changed the type of coffee and where to buy it. As all the world was locked down, the e-shop has offered a great opportunity, with the increase of the coffee sales by 57% in America) not just for the coffee but all the good in general so the life could go on (NCA, 2022).

On the other hand, a lot of studies are have shown the effect of coffee ingredients on the human body and are related to cardiovascular disease (Debry, 1994; Myers and Basinski, 1992; Palmer et al., 1995), bone health (Barger-Lux and Heaney, 1995, Heaney, 1998, Lloyd et al., 1998). Among others, issues have concerned cancer, spontaneous abortion, delayed conception, low birth weight and osteoporosis (Schilter et al., 2001).

In the market are found a different type of coffee which are mostly related to the social habit and culture of the population. Despite the type of coffee and the roasting process, the brewing techniques are used traditionally in different countries: espresso, Turkish, vacuum, percolator, filer, mocha etc. are some of the brewing methods that are used to extract most of the ingredients found in coffee (Petracco, 2001).

In the world exist three types of green coffee, Robusta, Arabica and Liberica coffee. The first two have the main production and the last one is produced less than 1% all over coffee country production. All the species of the Coffea, are of African origin and have spread over the years in different countries (Bridson and Verdcourt, 1988). Coffee cultivation is now widespread in tropical and subtropical regions, with the bulk of arabica coffee concentrated in Latin America and robusta coffee predominant in South-East Asia and Africa (Anzueto et al., 2005).

To produce Turkish coffee, Rio Minas is the perfect Arabica coffee, originating from Brazil to be used. Some of the stakeholders that we have made a survey have told us that it has all the characteristics to produce a high Turkish coffee quality. Some companies make a different blend to change the sensorial properties and to make them more desirable for the consumers.

2 Materials and Methods

The study aims to evaluate some of the physical and chemical properties of Turkish coffee, produced in the Albanian market. There are a lot of factories that produce different types of coffee (espresso, mocha and filter) but Turkish even though it is very easy to produce has some

specifics that not all the producers can do it. Also, the consumption of Turkish coffee is somehow related to the people. We have done an investigation and the data haven't been published yet, where it is shown that people are related to a specific company that produces Turkish coffee, and don't like the others brands.

We have bought in the market 20 samples of Turkish coffee and have determined the grade of the roasting as a specific component that can affect the value of some chemical components. We have codified and stored it in a dry and cool place till the time of evaluation.

Determination of moisture was done according to AOAC 968.11-1970, Moisture (loss on drying) in roasted coffee, where 10 gr of ground coffee were put in the oven with vacuum till the necessary time.

Determination of ash was done according to AOAC, 920.93-1920, ash of roasted coffee. In this method, 5 gr of roasted and ground Turkish coffee were put in the oven at a temperature of 750^{o}C till the time needed to evaluate the total ash.

Determination of acidity was done according to AOAC 920.92-1920, Acidity (total) of roasted coffee, with some modification as per extraction we used alcohol because of the high value of the fatty acid present in the coffee. 5 gr of roasted and ground coffee were put in a cylinder, and 25 ml of neutralized alcohol were added. After shaking sometimes, the cylinder was let to rest for 24 h and the titration of 10 ml of filtrate with 0.05 N NaOH took place.

Determination of coffee oil was done with the Soxhlet method. During this procedure, 2 gr of samples were dry and put in the cartridges and are placed in the extractor of the Soxhlet apparatus which is connected to the balloon, that has been previously dried in the thermostat at 100 $^{\circ}$C for 1 hour and weighed to the nearest 0,001 g. Up to 2/3 of the petroleum ether is poured here its volume. After extraction, the ether in the flask is distilled and the balloon is held for about 5 minutes over the water bath to remove even traces of ether. The balloon (or crystallizer) is placed in the thermostat and dried at 100°C for 20-30 minutes. Cool in the desiccator to room temperature and weigh accurately to 0.001g.

Determination of protein was done according to AACC Method 46-12 (1995) Crude Protein–Kjeldahl Method. During the application of this method, the digestion of ground Turkish coffee was done with H_2SO_4 and the boric acid was used as an indicator solution.

Determination of fibres (Ozoliņa et al., 2009) the samples were defatted and dried with a particle size less than 0.5 mm. After weighing, each sample was enzymatically digested with α amylase and incubated at 100 °C, and then the samples were digested with protease and amyloglucosidase and were incubated at 60 °C. After digestion, the total fiber content was precipitated by adding 95% ethanol. Then the solution was filtered and fiber was collected, dried and weighed.

Sensorial Evaluation: For the determination of the sensorial evaluation we have evaluated some characteristics like aroma, acidity and body, as the main parameters for the coffee cup. An evaluation was done by an expert panel and the value were from 1 to 10.

3 Results and Discussions

The aim of this study was to evaluate some of the physical and chemical properties of the

Turkish coffee that is produced and trade in Albania.

The degree of roasting has shown that 6 samples had value form 32-35 that show according to the SAA system that dark roasting and 14 samples have shown to have normal roasting with value from 53-55.

Table 1. Physical and chemical properties of Turkish coffee.

No	Sample Code	Moisture (%)	Ash (%)	Acidity (%)	Coffee oil (%)	Protein (%)	Fibers (%)	Carbohydrates (%)
1	NR1	2.4±0.25	4.03±0.17	0.94±0.24	13.9±0.32	15.3±0.24	31.88±0.21	49.56±0.21
2	NR2	3.1±0.13	4.09±0.27	0.93±0.36	13.8±0.57	16.1±0.41	34.46±0.23	45.86±0.37
3	NR3	2.9±0.27	4.08±0.05	0.91±0.41	13.5±0.54	14.9±0.26	31.89±0.21	47.51±0.11
4	NR4	2.5±0.17	4.32±0.42	0.83±0.03	14.2±0.16	15.2±0.17	32.76±0.04	59.25±0.24
5	NR5	2.8±0.15	4.09±0.23	0.87±0.81	14.6±0.23	15.9±0.24	31.99±0.37	61.23±0.06
6	NR6	2.6±0.31	4.13±0.01	0.89±0.28	14.8±0.47	14.3±0.12	31.86±0.23	69.56±0.12
7	NR7	2.7±0.22	4.25±0.28	0.81±0.43	14.9±0.21	16.5±0.24	33.84±0.48	64.29±0.47
8	NR8	3.4±0.13	4.36±0.22	0.86±0.74	14.5±0.03	16.1±0.24	32.56±0.46	57.26±0.06
9	NR9	3.3±0.27	4.52±0.18	0.84±0.53	14.6±0.21	15.7±0.16	31.86±0.24	53.94±0.75
10	NR10	3.1±0.22	4.29±0.47	0.95±0.18	14.7±021	15.9±0.17	34.29±0.85	68.51±0.52
11	NR11	2.9±0.14	4.19±0.23	0.72±0.52	15.6±0.24	14.2±0.32	32.59±0.31	64.86±0.41
12	NR12	2.6±0.35	4.23±0.11	0.84±0.25	14.9±0.31	16.5±0.52	31.94±0.02	61.28±0.24
13	NR13	2.7±0.24	4.53±0.27	0.85±0.04	15.7±0.22	14.2±0.63	34.56±0.31	65.48±0.15
14	NR14	1.9±0.13	4.29±0.51	0.79±0.27	15.1±0.42	14.9±0.41	33.28±0.39	63.58±0.27
15	DR15	1.3±0.48	4.59±0.23	0.76±0.23	15.7±0.18	15.2±0.68	32.59±0.27	64.58±0.27
16	DR16	1.6±0.05	4.52±0.75	0.74±0.41	15.3±0.07	14.9±0.15	31.85±0.29	58.24±0.09
17	DR17	1.8±0.42	4.53±0.14	0.76±0.27	15.4±0.11	16.2±0.34	33.89±0.18	54.29±0.27
18	DR18	1.9±0.14	5.68±0.22	0.79±0.09	15.9±0.53	16.7±0.21	34.52±0.04	52.63±0.14
19	DR19	1.8±0.43	4.62±0.35	0.75±0.17	15.7±0.74	15.8±0.33	32.95±0.25	48.18±0.08
20	DR20	2.1±0.47	4.63±0.39	0.7±0.11	14.2±0.55	14±0.31	31.49±0.24	52.64±0.28

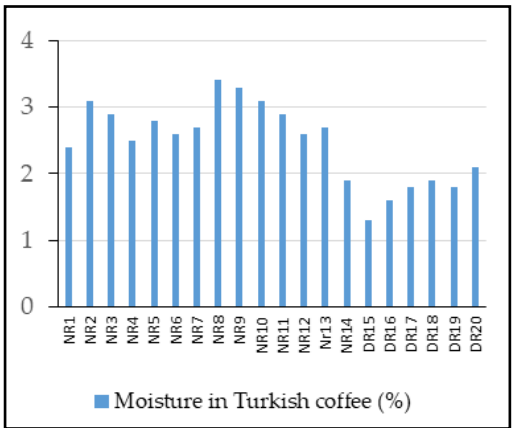

Figure 1: Moisture content in Turkish coffee (%).

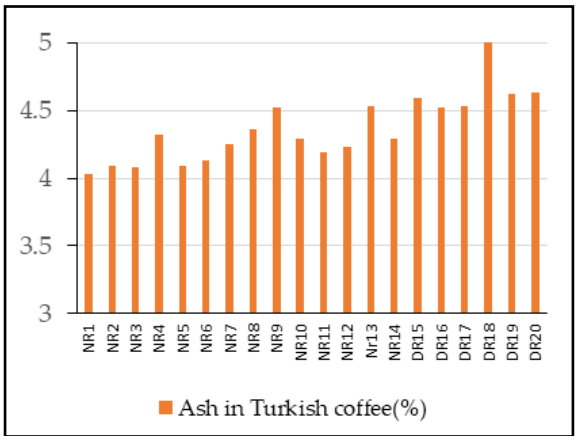

Figure 2: Ash content in Turkish coffee (%).

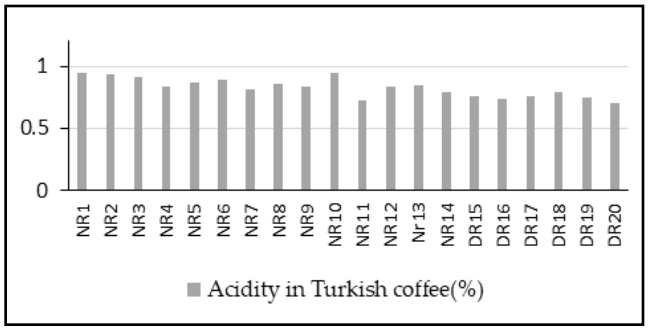

Figure 3: Acidity content in Turkish coffee (%).

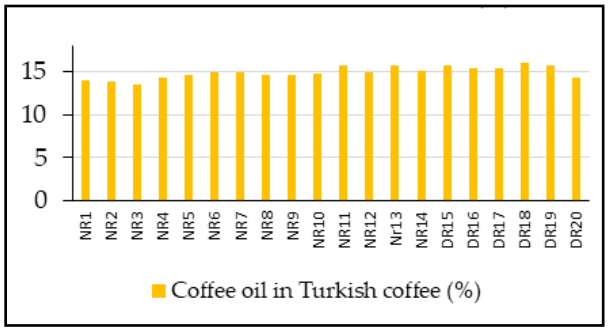

Figure 4: Coffee oil content in Turkish coffee (%).

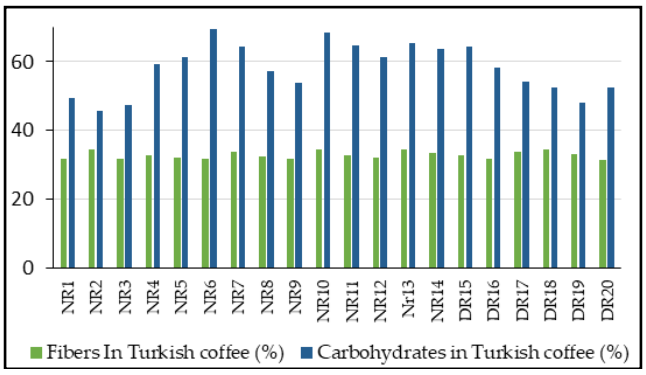

Figure 5: Content of fibers and carbohydrates in Turkish coffee (%).

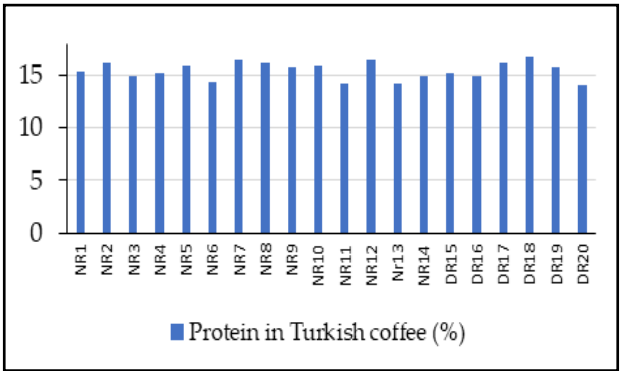

Figure 6: Protein content in Turkish coffee (%).

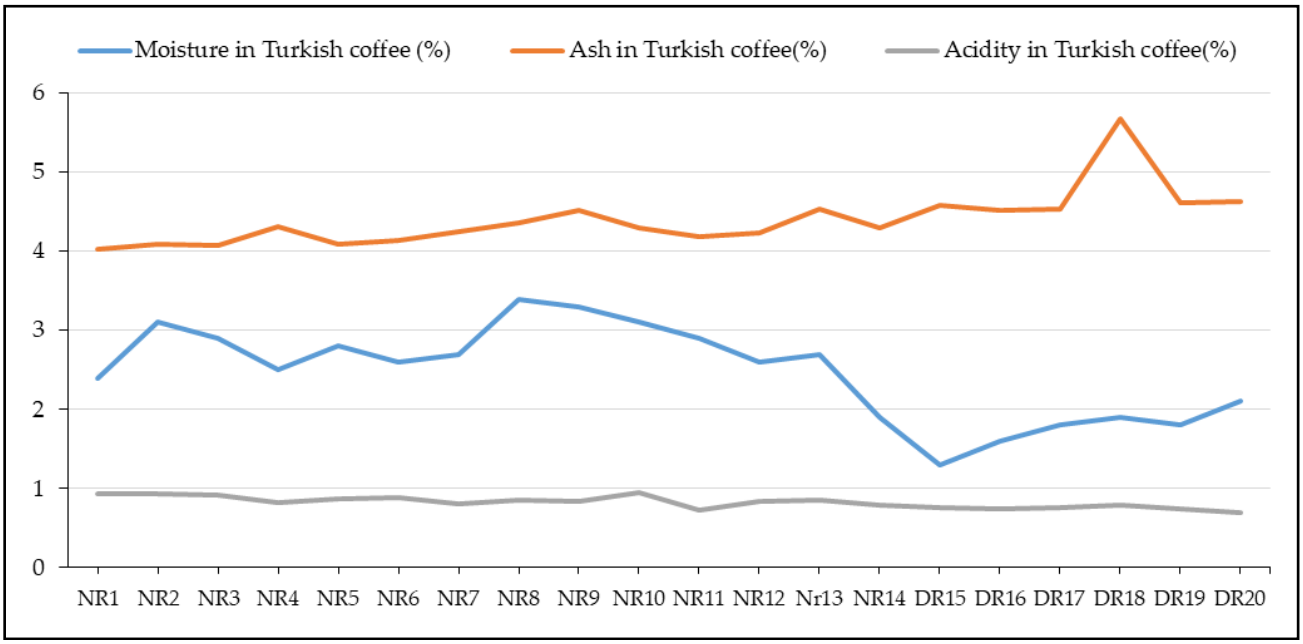

Figure 7: Correlation between moisture, ash and acidity in Turkish coffee.

Table 2. Sensorial evaluation of Turkish coffee.

No	Code	Aroma (1=very bad to 10= excellent) (mean value)	Acidity (1=very low-10 extremely high) (mean value)	Body (1=very bad to 10= excellent) (mean value)	No	Code	Aroma (1=very bad to 10= excellent) (mean value)	Acidity 1=very low-10 extremely high) (mean value)	Body (1=very bad to 10= excellent) (mean value)
1	NR1	7.4	8.7	9.8	11	NR11	8.4	9.7	8.3
2	NR2	7.6	7.6	10	12	NR12	7.9	8.4	8.4
3	NR3	7.7	9.5	8.4	13	NR13	9.4	7.6	9.2
4	NR4	7.3	7.9	9.5	14	NR14	8.3	5.5	9.4
5	NR5	9.5	8.1	8.7	15	DR15	7.4	6.9	8.2
6	NR6	5.4	6.6	8.6	16	DR16	6.3	7.2	7.9
7	NR7	7.6	8.5	7.6	17	DR17	7.7	6.9	9.8
8	NR8	8.2	7.3	7.4	18	DR18	6.3	6.5	9.4
9	NR9	6.8	8.8	8.6	19	DR19	7.4	7.1	9.7
10	NR10	9.8	6.6	8.7	20	DR20	8.3	8.9	9.2

In this study, 20 samples of Turkish coffee were taken for the evaluation of the physical, chemical and sensorial properties. All the samples are manufactured by the Albanian industries.

The moisture in roasted coffee has an important role because its high value of it can affect the freshness of the coffee. Roasted and ground coffee can absorb water, and they should be stored in a dry and cool place with protected backs. The moisture present in Turkish coffee ranges from 1.6 to 3.5% with a mean value of 2.47% (figure 1). This value is suitable for storing Turkish coffee for a long time in optimal conditions.

The value of the ash present in Turkish coffee ranged from 4.01-4.68% (figure 2), with a mean value of 4.4%. The value of the ash in coffee depends on the production process of green coffee, washed or unwashed ad also on the grade of the roasting process. Higher the degree of roasting, the higher the value of ash. This was also seen even in our samples where the higher value was seen in DR18.

The value of acidity in our samples ranged from 0.7 to 0.95%, with a mean value of 0.83% (figure 3). A low value of acidity was found in the samples with a dark roasting process which is also described by (Marbrouk et al., 1959). The low value of acidity was percept even in the sensorial properties where the sensorial panel gave a lower value to the samples with the dark roasting, from 6.3 to 7.2 points.

The level of protein in the Turkish coffee samples ranged from 14-to 16.5%, with the higher value in DR 18 (figure 6).

The determination of carbohydrates in Turkish coffee samples ranged from 44.5 to 69.56% (figure 5), with a higher value at sample NR 6. The role of carbohydrates in coffee is related to the foam (Nunes et al., 1997) which was percept even in our samples.

The coffee oil present in our samples ranged from 13.8 to 15.76% (figure 4). The level of coffee oil is important because it has some loss during the roasting process, but in total value is higher than the raw material, because of dry matter content loss on roasting. (Vitzthum et al., 1976). The level of coffee oil is also related to the level of aroma because most of the aromas are liposoluble (Illy and Viani, 2005).

Fibers in Turkish coffee were found to range from 31.85 to 34.56% (figure 5). Studies have suggested that coffee fiber isolated from roast coffee extracts can lower colon cancer risk (Rao et al., 1998).

4 Conclusion

This study aimed to evaluate some physical, chemical and sensorial properties of Turkish coffee that is produced and traded in Albania. 20 samples were taken into consideration and during the first evaluation was detected that almost 14 of them, according to the SAA system had normal roasting with a value from 53-55 and 6 of them had a dark roast with a value from 32-35.

All the samples were analyzed for moisture, protein, coffee, carbohydrates, fibres, acidity and some sensorial parameters like body, acidity and aroma. All the data taken for the ground Turkish coffee have shown that the level of moisture ranged from 1.6 to 3.5%, whereas the sample NR8 had a higher value of it. The ash from 4.01-4.68 %, and they were found respectable in samples NR1 and DR18, acidity from 0.7-0.95%, the sample NR10 had a higher value, protein from 14-16.7%, with higher value at samples DR18, carbohydrates from 44.5-69.56%, found in samples Nr2 and NR6 respectability, coffee oil from 13.8-15.76% and fibers from 31.85-34.56% with higher value at samples NR13.

There was a correlation between the higher value of acidity and the perception by the test panel. Also, a correlation was found between the degree of roasting and the level of coffee oil and acidity which was described even in other studies mentioned above.

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Conflict of interests

All authors declare that they have no conflicts of interests.

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