

SOME GENERAL CHARACTERISTICS OF PICKLED HERBS USED IN MAKING VAN HERBY CHEESE

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ABSTRACT: Microbiological quality is the most important aspect for pickled products as in other foods. Only 14 - pickled herb samples were obtained from retail markets in Van, and analyzed for microbiologically and chemically. The obtained average results were as the following; pH 3.85, titrable acidity 1.06 %, salt concentration 5.82 %, total aerobic count 5.73 log/g, count of Coliform group 3.31 log/g, total Enterobacteriaceae 3.40 log/g, and molds - yeasts 6.09 log/g. It was understood from the study that there was no standart on chemical aspect, and the pickled herbs may be a source of microbiologically potential hazard for people.

Key Words: Microbiology, pickled herbs.

VAN OTLU PEYNİRİNİN YAPIMINDA KULLANILAN SALAMURA OTLARIN BAZI GENEL ÖZELLİKLERİ

ÖZET: Diğer gıdalarda olduğu gibi turşularda da mikrobiyolojik kalite çok önemlidir. Yalnızca 14 salamura ot örneği Van piyasasından temin edilebilmiştir. Satın alınan örnekler mikrobiyolojik ve kimyasal analizler uygulanmıştır. Örneklerden elde edilen ortalama değerler şöyledir; pH 3.85, titredilebilir asitlik % 1.06, tuz oranı % 5.82, toplam mikroorganizma sayısı 5.73 log/g, Coliform sayısı 3.31 log/g, toplam Enterobacteriaceae sayısı 3.40 log/g, maya ve küf sayısı ise 6.09 log/g'dir. Çalışmadan elde edilen sonuçlara göre, incelenen salamura ot örneklerinin kimyasal bakımdan standart bir özellik taşımadığı ve insan sağlığına zararlı olan patojen mikroorganizma kaynağı olabileceği anlaşılmıştır.

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INTRODUCTION

About 25 kinds of herbs such as *Allium sp.*, *Thymus sp.*, and *Ferula sp.* are used in making Van herby cheese. However, the most used one is *Allium sp.* They are added into the vat to get the desired flavor for the cheese (1). The herbs are collected from plateaus in Spring season. Producers can use either single or mixed herbs to prepare pickle. After washing well, they are cut into slices and placed into a plastic container. Brine with concentration of 16 % salt is poured into the container. For a period of 15 or 20 days, pickled herbs are stored in a cool place. Producers mostly use whey-brine instead of tap water-brine. After that, the pickled herbs are ready for adding into the cheese. Approximately, 2% of herbs depending on producer is used for the vat-cheese milk (2). The pickled herb is also sold in market so that they can be found through seasons.

There are various studies on Van Herby Cheese regarding chemical, biochemical, microbiological, and sensorial characteristics (3, 4, 5, 6). Coşkun (7) studied the inhibitory effect of some herbs (*Allium schoenoprasum*, *Thymus nigricus*, *Mentha spicata*, and *Anthriscus nemorosa*) on the growth of some group of microorganisms. He found that especially *Allium sp.* had inhibitory effect on Coliform groups. Özçelik (1) studied on nomenclature of herbs mainly used for the cheese making. However, no study was reported on the microbiological and chemical characteristics of pickled herbs.

On the other hand, however, there are many studies on pickles made from various vegetables such as cucumber and sauerkraut. Türkür (8) noted that pickles of cucumbers had pH range between 3.5 - 3.8 and titrable acidity 0.5 - 1.0 % in last stages of fermentation. Also, he stated that the concentration of salt could be increased to the level of 15 %. That salt concentration below 7.5 - 8 % may cause spoilage in pickles was reported as well. Additionally, salt content and temperature of fermentation influence on bacterial flora, quality and chemical composition of the pickled product. If high salt concentration and temperature are used, the color, flavor, and texture may become poor (9). Microbial flora for cucumber pickles were found to contain as high as 5.3×10^7 total aerobes, 10^6 Coliforms, 4.6×10^3 molds, and 6.6×10^3 yeasts in initial stages. It was also stated that counts of the microorganisms increased rapidly during fermentation (10).

This study was primarily conducted to indicate the microbiological population level of the pickled herbs and hygienic quality, and to indicate acidity and salt concentration.

MATERIALS AND METHODS

Only 14 - pickled herb samples were able to be obtained from cheese shopping stores in Van City. The mixed herbs, prepared from different kinds of herbs mentioned previously, were predominant in the samples obtained. They were brought to the laboratory in sterile jar containers and analyzed for microbiologically and chemically.

Bacterial counts were determined on the following media: total count on plate count agar (PCA) and incubated at 32°C for 3 d; total Enterobacteriaceae on violet red bile agar (VRBA) with 1 % glucose and incubated at 32°C for 24-48 h; Coliform bacteria on violet red bile agar (VRBA) and incubated at 32 °C for 24h; molds and yeasts on potato dextrose agar (PDA) acidified with sterile 10 % tartaric acid to pH 3.5 - 3.6 and incubated at 30°C for 3 - 5 d (11).

Titration acidity as lactic acid (T.A. %), pH, and salt content of brine of pickled herb samples were determined as described by Fleming et al. (11).

RESULTS AND DISCUSSION

The results obtained from the pickled herb samples were presented in Table 1. As seen from the Table, the range of pH were between 3.25-4.25 and average was 3.85. Furthermore, titration acidity was between 0.74 - 1.51 %, and average was 1.06 %. The values found for both titration acidity and pH were similar to those indicated for cucumber pickles by Türker (8). The acidities of the samples showed a slight difference from each other, and this may be affected by a lot of conditions, for instance, storage temperature, salt concentration, species of herb, and lactose available. The latest one is important factor since they mostly use whey-brine, source of carbohydrate for many microorganisms.

Salt concentration of pickled herb samples were between 3.0 % - 8.8 % and average was 5.82 %. As seen, results have a wide range. This indicates that there is no standard about adding salt into the cheese. Since salt concentration affects on growth of both desired and undesired microorganisms, it should be adjusted according to the growth of desired bacteria like lactic acid bacteria.

Total aerobic counts obtained from the samples were between 4.36 - 6.39 log/g, and average 5.73 log/g. The obtained results were lower than reported by Etchells et al. (10). This can be explained by inhibitory effect of herbs since some of them like *Allium* sp. have bacteriocidal properties although those kinds of herbs carry various microbial populations (7, 12, 13).

Table 1. Some chemical and microbiological characteristics of pickled herb samples

Sample No	CHARACTERISTICS						
	CHEMICAL			MICROBIOLOGICAL (Log ₁₀ /g)			
	pH	T.A.(%)	Salt(%)	Total Aerobic Count	Coliform	Total Enterobacteri.	Molds and Yeasts
1	4.25	0.74	8.4	5.49	4.32	3.81	6.59
2	4.00	0.83	3.0	5.36	4.25	4.23	5.21
3	4.00	0.82	4.2	5.25	4.32	4.48	4.99
4	4.22	0.78	3.6	5.49	4.64	4.54	6.54
5	3.94	1.11	7.5	5.81	4.43	2.97	6.49
6	4.07	0.82	4.8	6.39	3.30	3.36	6.46
7	3.48	1.30	3.2	6.38	1.00	3.30	6.33
8	3.97	1.10	7.9	4.36	4.17	3.78	5.20
9	3.70	1.14	5.9	6.37	3.95	4.38	6.34
10	3.53	1.30	4.0	5.55	1.00	4.60	6.14
11	3.25	1.51	4.5	6.02	1.00	3.99	6.45
12	3.84	1.12	7.9	5.71	3.90	5.15	6.43
13	3.85	1.12	8.8	5.90	3.78	3.41	5.69
14	3.77	1.13	7.8	6.07	2.20	3.15	6.38
Min.	3.25	0.74	3.0	4.36	1.00	2.97	4.99
Max.	4.25	1.51	8.8	6.40	4.64	5.15	6.59
Average	3.85	1.06	5.82	5.73	3.31	3.94	6.09

As known, Coliform group may implicate the presence of enteric pathogens. They can grow in the gastrointestinal tract of human and some animals. Results from the Table show counts of Coliform group as low as 1.00 log/g and as high as 4.64 log/g. They were lower than those of cucumber pickles (10). This may implicate that even if some of herbs have inhibitory effect on growth of Coliform group, there is always a chance to have them in pickled herbs because of post-contamination (7)

Total Enterobacteriaceae was 2.97 log/g as minimum and 5.15 log/g as maximum. Average count was 3.40 log/g. Counts of this group were higher than Coliform group of the samples. As in Coliform group, the presence of Enterobacteriaceae is an important factor for human health since members of the family such as *Salmonella*, *Shigella*, and *Escherichia* can cause food borne gastroenteritis (14).

Counts of yeasts and molds were the highest among the other groups of microorganisms. The reason for that, the storage of the pickled herbs has

being done at room temperature. Also they have been sold in open containers and it allows aerobic microorganism to grow. The range was between 4.99 - 6.59 log/g, and average took the value of 6.09 log/g. Yeasts and molds play considerable role in terms of spoilage in such products. For example, molds can cause softening spoilage and yeast can make bloating. Therefore, these two groups are highly undesirable organisms in the pickled herbs (15,16).

CONCLUSION

Since the pickled herbs are eventually used in manufacturing the cheese and they affect on the quality of the cheese, their hygienic properties are important factor for public health. Therefore, some precautions should be taken into consideration; 1) If possible, pasteurization procedure should be applied. If this heating method reduces the flavor of herbs, the other preservation methods ought to be tested, 2) Storage conditions especially temperature should be controlled to prevent the activity of spoilage microorganisms, 3) Certain preservatives such as acetic acid, sodium benzoate, potassium sorbate, and sulfur dioxide, can be tested for the best result, 4) The most important one is that post-contamination should be cared as much as possible during processing.

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