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Research Article

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The Effect of Spearmint Oil on the Sensorial Properties of Rainbow Trout (*Oncorhynchus mykiss*) Fillets under Refrigerator Conditions

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Abstract In this study, it was examined the sensorial properties to *Oncorhynchus mykiss* fillets of spearmint essential oils during storage 4±1°C. So as to create all samples was applied 1% spearmint oil to fillets of rainbow trout. During the storage at 4 ± 1 ° C of fillets in the study were made every three days sensory analyzes (Appearance, Flavor, Colour, and Odor). As a result of the sensorial analysis ended the storage period on the 6th day of fresh fish fillets, on the 12th day of the fillets treated with 1% spearmint oil and on the 18th day of the fillets treated with 3% spearmint oil. As a result, it has been observed that the application of spearmint essential oil has a positive effect on the sensorial properties of rainbow trout under refrigerator conditions.

Keywords Spearmint, Essential oil, *Oncorhynchusmykiss*, Sensorial properties, Refrigerator conditions

Introduction

It is known that fish meat, which has an extremely high nutritional value, could spoil quickly. Changes in the sensory (appearance, flavor, odor and color) properties of food are defined as spoilage [1]. The use of additives in perishable food before cold storage could minimize microorganism growth during storage. However, since there are limits for additive use, their presence in food products should be limited. Furthermore, it is known that most consumers refrain from consuming food that contains chemical additives, albeit in safe levels [2-4]. Today, the employment of herbal additives has been increasing due economic, nutritional and safety reasons [5].

Spearmint is a creeper, hairless and perennial plant in Lamiaceae family [6,7]. Carvone, limonene, eucalyptol are the main compounds in spearmint essential oil [8-10]. Spearmint essential oil has antibacterial, insecticidal and antifungal properties [11, 12]. Spearmint essential oil is widely used in food, pharmaceutical, cosmetic and perfume industries [11, 13].

The present study aimed to report the effect of spearmint essential oil on the sensory properties of *Oncorhynchus mykiss* fillets at 4 ± 2 ° C during storage.

Experimental

Trout samples were procured from a fish farm located in Keban Dam Lake and immediately transported to Firat University Bioengineering Laboratory on ice. Fish were washed and filleted. Then, the samples were randomly divided into three groups: the control group A without essential oil application, the samples were treated with 1%

essential oil, and the samples were treated with 3% essential oil. All analyzes were conducted in triplicate on days 0., 3., 6., 9., 12., 15.and 18..

Organoleptic assessment

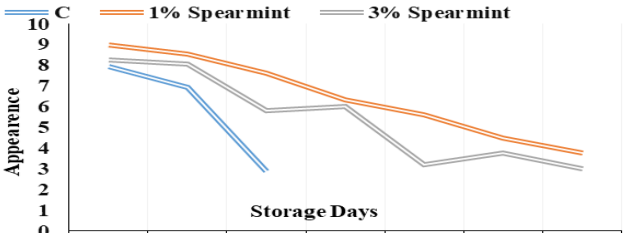
In the Organoleptic assessment of samples made from *Oncorhynchus mykiss*, panelists (n=15) formed from in the age range 25-60. Organoleptic assessment were made in accordance with the method of Lawless and Heymann [14]. The samples were baked in a baking at 12 minutes at 180 °C. Panelists evaluated organoleptic assessment of the samples on a hedonic scale (9-point) (like extremely: 9, like very much: 8, like moderately: 7, like slightly: 6, neither like nor dislike: 5, dislike slightly: 4, dislike moderately: 3, dislike very much: 2, dislike extremely (1)).

Result and Discussion

The present study investigated the effects of spearmint essential oil (1% and 3%) on the sensory qualities of rainbow trout in 2 ± 2 ° C storage.

Appearance

The appearance properties determined during the storage of the experimental trout fillets are presented in Figure 1. It was determined that the appearance score of the samples without essential oil was 7.92 ± 0.64 on the first day of storage and 2.90 ± 0.83 on the last day of storage (6th day).The appearance score of the samples with 1% peppermint essential oil treatment was 9.00 ± 0.00on day 0, and the score dropped to 3.75 ± 0.82 at the end of the storage. In samples treated with 1% spearmint essential oil, the appearance score was 8.25 ± 0.12 on day 0th, and the score dropped to 3.00 ± 0.70 at the end of storage. In a study conducted by Karaton Kuzgun, [15], a decrease was observed in the appearance score of fillets covered with chitosan coating film that included thyme, clove, rosemary essential oils. This finding was consistent with the present study results.



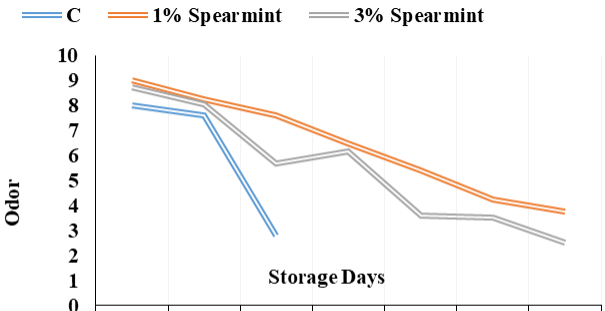
	0.	3.	6.	9.	12.	15.	18.
C	7,92	6,93	2,9				
1% Spearmint	9	8,53	7,6	6,33	5,6	4,5	3,75
3% Spearmint	8,25	8,07	5,8	6	3,2	3,75	3

Figure 1: The changes in the appearance of spearmint essential oil treated trout fillets

Odor

The odor scores determined during the storage of *Oncorhynchus mykiss* fillet samples treated with spearmint essential oil are presented in Figure 2.

The odor scores of the fillet employed in the study were determined between 9.00 ± 0.00-2.50 ± 0.50. The control group odor score was determined as 8.00 ± 0.57 at the beginning of the storage, and at the end of the storage (6th day), the score reached 2.80 ± 0.75. In the 1% spearmint essential oil group, it was determined that the odor score was 9.00 ± 0.00 on day 0 of storage, and it was 3.75 ± 0.43 on the 18th day, the last day of storage. In samples treated with 3% spearmint oil, the odor score was determined as 8.75 ± 0.43 on day 0, and this value dropped to 2.50 ± 0.50 at the end of storage. In previous studies, odor scores reported for fillets treated with cinnamon essential oil [16] and other herbal essential oils, such as black cumin [17] were similar to the present study findings.

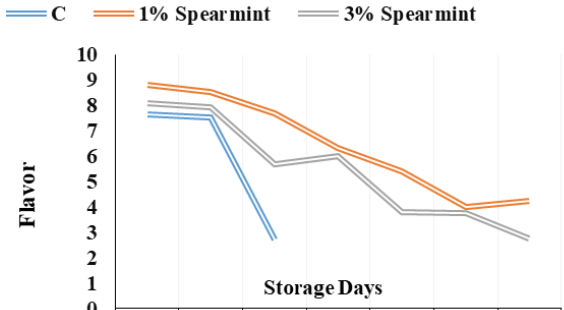


	0.	3.	6.	9.	12.	15.	18.
C	8	7,6	2,8				
1% Spearmint	9	8,27	7,6	6,5	5,4	4,25	3,75
3% Spearmint	8,75	8,07	5,7	6,17	3,6	3,5	2,5

Figure 2: The changes in the odor of spearmint essential oil treated trout fillets

Flavor

The flavor scores determined during the storage of the experimental trout fillet samples are presented in Figure 3. The flavor score of the control group fillets was 7.67 ± 0.84 on day 0, the flavor score exhibited a steady decrease during storage to 2.70 ± 0.78 on day 6th. In the samples treated with 1% spearmint essential oil, the lowest flavor score was determined on day 12th of storage (4.25 ± 0.71). The decrease was consistent throughout the storage period. The highest score was determined as 8.83 ± 0.37 on day 0 of storage. In samples treated with 3% spearmint essential oil, the flavor score was 8.08 ± 0.76 at day 0and decreased to 2.75 ± 0.43 at the end of storage. Ojagh et al. [16] reported that chitosan coating enriched with cinnamon essential oil led to a higher flavor score in trout when compared to the control group. This finding was consistent with the present study findings. Oajgh et al. [16] reported in another study that cinnamon oil enriched and chitosan coated trout samples exhibited lower flavor scores when compared to the control group. This finding was consistent with the present study findings.



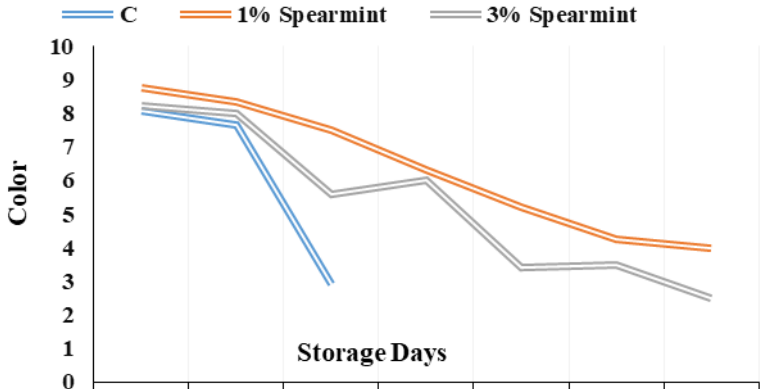
	0.	3.	6.	9.	12.	15.	18.
C	7,67	7,53	2,7				
1% Spearmint	8,83	8,53	7,7	6,33	5,4	4	4,25
3% Spearmint	8,08	7,93	5,7	6	3,8	3,75	2,75

Figure 3: The changes in the flavor of spearmint essential oil treated trout fillets

Color

The color scores determined during the storage of the experimental trout fillets are presented in Figure 4. The color score of the samples without essential oil treatment was 8.08 ± 0.64 on the first day of storage and 2.90 ± 0.83 on the last day of storage (6th day). On day 0, the color score for the samples treated with 1% essential spearmint oil was 8.75 ± 0.43, and the color score decreased to 4.00 ± 0.71 after storage. The color score for the samples treated with 3% essential oil was 8.25 ± 0.60 on day 0, and the score decreased to 2.50 ± 0.50 at the end of storage. Karaton

Kuzgun [15] observed a decrease in the appearance scores of fillet samples covered with chitosan coating film that included thyme, clove, rosemary essential oils. This finding was consistent with the present study findings.



	0.	3.	6.	9.	12.	15.	18.
C	8,08	7,66	2,9				
1% Spearmint	8,75	8,33	7,5	6,33	5,2	4,25	4
3% Spearmint	8,25	8	5,6	6	3,4	3,5	2,5

Figure 4: The changes in the total appreciation of spearmint essential oil treated trout fillets

Conclusion

In conclusion, it could be suggested that a natural antimicrobial and antioxidant, spearmint essential oil improved the sensory properties of *O. mykiss* fillets and could be utilized to preserve other food products. The study findings underlined the necessity of further studies on consumption of food products and seafood prepared with natural preservatives.

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