

Fish Skin Gelatin from Tilapia Skin by Acid Extraction

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Introduction

Gelatin has a very broad application for e.g. in the food, pharmaceuticals, and photographic industries. Present commercial gelatins are produced from skins and bones of cows and pigs. However, in the last few years, gelatin from the skin of temperate fish has been produced in the United States. Fish skin is normally discarded in the filleting operation. Some recovery of the skin is possible in the deboning operation. Reports in the literature have indicated that gelatin obtained from fish is different from gelatin obtained from higher animals. Difference in the properties of gelatin obtained from temperate fish as compared to tropical fish has yet to be studied. Since, fish skins are potential source of gelatin, therefore, a study on the extraction of gelatin for food application and the determination of the physico-chemical characteristics of the gelatin obtained from black (*Oreochromis mossambicus*) and red (*O.nilotica*) tilapia skin was undertaken. Tilapia is the chosen species due to its present world-wide abundant. The effect of drying techniques was also determined.

Materials and Methods

The fresh skin was obtained by manually filleting the tilapia fish. However, alternative skin from deboned fish can also be utilized when available. The skins were washed off blood pigments and slime, soaked in mild alkali solutions, rinsed, soaked in mild organic acids and finally rinsed in running tap water and soaked in water for the extraction process. The contact time for each step can be varied. The resultant slurry obtained during final soaking was filtered and dried prior to analysis. The analyses carried out are those related to quality indices of gelatin such as rheological properties, amino acid profile, peptide bands, and visual properties such as color and odor.

Results and Discussion

The gelatins of the black and the red tilapia were yellowish and light textured. Gelatins of black and red tilapias had fishy odor and the gelatin from black tilapia had a stronger odor. This muddy note could most probably due to the diet of the fish since black tilapia used was from the wild. Both the gelatins were yellowish in color when dried in the vacuum oven. However, color has not been noted to interfere with the functional properties of the gelatin. Higher bloom strength was obtained from gelatin of black when compared to gelatin from red tilapia skin. Other studied properties such as viscosity, amino acid profiles, and melting point of the gelatins obtained indicated that the gelatin from these two closely related fish species does not exhibit the same physico-chemical characteristics. Drying method also affected the quality of the gelatins obtained. This could be due to the different degree of denaturation incurred by the gelatins during the drying process. Species from the temperate fish have approximately the same amount of total a.a content with these tilapia gelatins but of different proportions.

Conclusions

The results above indicate that gelatin from two different species of tilapia produce gelatin of different characteristics. Vacuum oven drying produces gelatin of lower bloom strength, viscosity and melting point as compared to that reported from the freeze-dried procedure. The gelatin colour is also affected by the drying procedure.

Benefits from the study

Development of a procedure for the extraction of fish skin gelatin for tilapia in particular and for tropical fish skin at large. Production of gelatin, a food ingredient, from cultured tropical freshwater fish.

Patent(s), if applicable:

Not applicable for time being

Stage of Commercialization, if applicable:

Have potential, but requires the interest of the private sector.

Project Publications in Refereed Journals

1. **Jamilah, B.** and Harvinder, K. 2002. Properties of gelatins from skins of fish-black tilapia (*Oreochromis mossambicus*) and red tilapia (*Oreochromis nilotica*). *Food Chemistry*.77: 81-84.

2. Harvinder, K., Jamilah, B., Russly, A.R., Badlishah, S.B. 2003. Properties of collagen from red tilapia (*Oreochromis nilotica*) skins due to different enzymes extraction and storage period. *Journal of Science of Food and Agriculture* (to be submitted).

Project Publications in Conference Proceedings

1. Harvinder, K., Jamilah, B., Russly, A.B., Badlishah, S.B. 2003. Collagen and gelatin from red tilapia (*Oreochromis nilotica*) skins- its properties. 2003. Pameran dan persidangan penyelidikan dan pembangunan IPTA 2003. 2-5 Oktober, PWTC, Kuala Lumpur.
2. Harvinder, K., Jamilah, B., Russly, A.B., Badlishah, S.B. 2003. Collagen and gelatin from red tilapia (*Oreochromis nilotica*) skins- its properties. 2003. Pameran rekacipta dan penyelidikan UPM 2003. 8-10 July, UPM. *Won gold award*

Graduate Research

Name of Graduate	Research Topic	Field of Expertise	Degree Awarded	Graduation Year
Harvinder Kaur	Extraction, characterization and functional properties of gelatin from red tilapia skins	Food Processing and chemistry	MSc	In the process

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