

EFFECT OF ACID WASHINGS ON THE QUALITY OF BLACK TILAPIA FILLETS

I.A. Nurul, B. Jamilah, F.B.H. Ahmad and Y. Salmah

Faculty of Food Science and Biotechnology
Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor,
Malaysia

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Introduction

Muddy characteristics in freshwater fish can render the fish and its products unmarketable or decrease in its acceptability. This has been reported for catfish cultured in Mississippi, USA, trout in Canadian waters and similar findings on Malaysian freshwater fish such as tilapia, catfish and carp. Freshwater fish is mainly produced through aquaculture and globally it is an important source of protein. The local practice to decrease this muddy odour and flavour which is frequently associated with freshwater fish is by washing the fish with acidic substances such as tamarind juice, lime or acetic acid. Therefore, this study was focused on the determination of the ability of several organic acid solutions in removing or reducing these unwanted characteristics. Other effects of the treatment, may it be positive or negative on the quality of the fish was also documented.

Materials and Methods

Live tilapia were brought to the faculty laboratory and killed by a sudden blow on the head. This was to ensure extreme freshness of the starting material. They were then split into experimental lots for various treatments. Washings with various concentrations of tartaric, citric and acetic acids solutions for 10 min were carried out. After which they were rinsed in distilled water to remove any residue of the washing solutions. The effectiveness of the washing treatments were determined by identifying the residual muddy characteristics in the fish muscle through sensory evaluation by trained panelist as well as through gas chromatography and mass spectrum (GCMS) output. The physical changes in the muscle

were investigated through scanning electron microscopy (SEM) whereby the depth and degree of muscle degradation were observed.

Results and Discussion

The results indicate that the effectiveness of the washing treatments in the removal of the muddy component varies with the acid used. The acids also had the ability to camouflage the muddy characteristics as commented by the panelists. Unlike the alkali washing treatment, the reduction of the muddy odour and flavour works through a different mechanism. The apparent absence of geosmin (since through GCMS analysis) can be due to the conversion of the geosmin into an odourless compound i.e. argosmin beside the possibility that it is leached into the washed water. Increasing the concentration of all acids above 0.125M seems to result in negative effects to the fish muscle characteristics. Texture of the fish muscle becomes fibrous and increases in opacity unlike in alkali washings where the muscle turned into gel-like translucent substance. Increases in the yellowness of the samples were also observed. All quality indicators monitored tend to indicate that acid washings may be superior to alkali washings, however, the main drawback is the depth of penetration of the acid into the muscle. The outer muscle layers were found to denature and thus formed a distinct outer zone preventing further penetration of the acids from the washed solution into the interior layer. Hence decreasing the effectiveness of the treatment since the denatured layer will also prevent the leaching of the geosmin and 2-methylisoborneol (MIB). Electron microscopy also showed that the muscle had different pattern of denaturing upon exposure to different acids.

Conclusions

The acid washings of the fish muscle is effective in reducing the muddy flavour and odour of the fish muscle. It also has the ability to camouflage the muddy character. The effectiveness of the acid washings varies. Washings should not be carried out with acid concentration above 0.125 M when the contact time is for 10 min. The noticeable textural degradation is different from that observed in alkali washings.