

Fish caviar substitutes: A novel option for value addition

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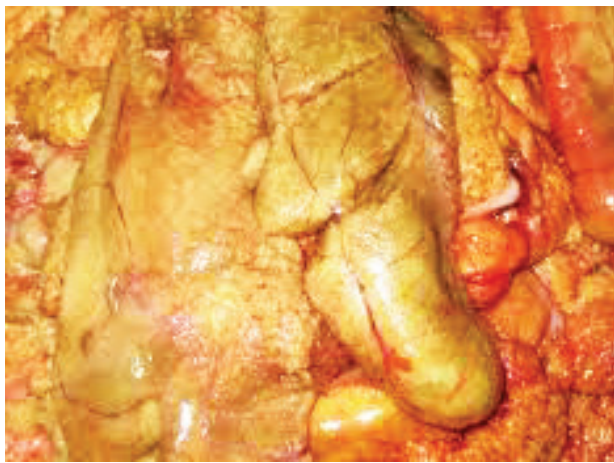
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The term 'roe' refers to the fully ripe internal egg mass in the ovaries of fish and certain other animals. Fish roes are highly nutritious as they contain considerable proportion of poly-unsaturated fatty acids and amino acids. Lipid profile of roes of some commercial fishes indicated higher proportion of phospholipids (as high as 37%) along with eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) in all the lipid classes (Rao *et al.*, 2010). Fish roes are rich in various extractives, particularly small peptides and free amino acids such as alanine, glutamic

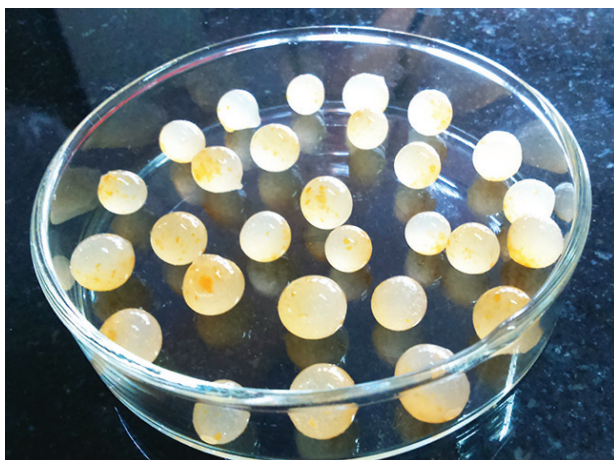
acid, valine, glycine, arginine and methionine, which give characteristic taste and flavour to the roe (Chiou *et al.*, 1988). However, direct use of fish roe in food formulations has several implications due to high susceptibility to fat oxidation, leading to the development of intense off-flavour. Currently, the roe obtained from fish such as salmon, sturgeon and cod has a potential commercial market, whereas roe from other fish species such as carp is either discarded or sold at very low price, as it forms a jelly mass during cooking. In order to diversify and enhance the

utilization of this nutritional resource, fish caviar substitute was formulated by reconstituting the dehydrated carp roe with sodium alginate at different proportions following reverse spherification technique.

A series of trials were carried out using freeze dried roe and sodium alginate to derive the ideal combination of the mixture components for reverse spherification. Further, the caviar forming solution was stabilized with polyphenol mixture extracted from dried oregano (*Origanum vulgare*) leaf. After the addition of oregano extract, the mixture was homogenized at 15 rpm for 10 min. in an ice bath to obtain a homogenous viscous suspension. The reverse spherification of caviar mass was achieved by dropping the suspension in to a cross-linking solution (Fig. 1). The biochemical, microbial and textural character-



Carp roe mass



Caviar substitute

Fig. 1. Caviar substitutes prepared from carp roe

istics of the resultant beads were evaluated under storage at 4 °C. The results were compared with beads made without addition of oregano extract.

The caviar substitutes were found to be shelf stable under chilled storage for a period of 16 days after which deteriorative changes were observed. The addition of oregano extract retarded lipid oxidation process. However textural data revealed that the substitutes containing oregano extract were much softer compared to control samples. Microbiologically, the oregano extract treated samples showed a lower Total Viable Count (TVC) compared to control beads which were in co-relation with the Total Volatile Base Nitrogen (TVB-N) values obtained for the samples. Scanning electron microscopic image suggested a honey-comb like structure for the freeze dried caviar substitute samples with 0.5% oregano extract, congenial for the better retention of polyphenol mixture for an extended period (Fig. 2). In brief, the results indicated that 0.5% concentration of oregano extract was sufficient to prevent oxidative and microbial degradation in the product. Thermal Gravimetric Analysis (TGA) confirmed the stability of oregano polyphenols in caviar substitutes as there was no separate transition band for oregano extract.

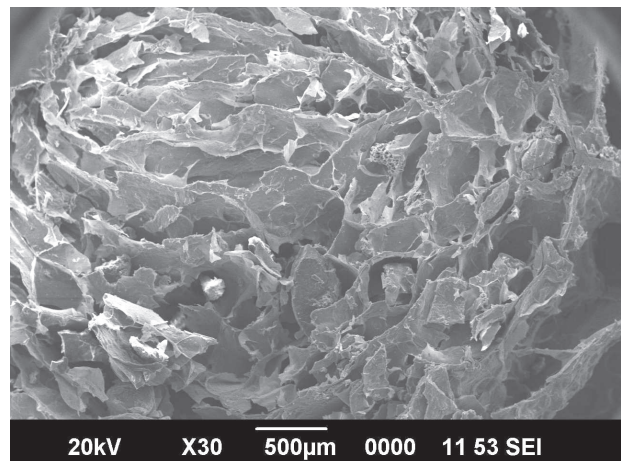


Fig. 2. SEM image of caviar substitute with honey comb structure

The current study identifies the potential of utilizing the roe from freshwater carps by converting the roe mas to novel high value products such as fish caviar substitutes with suitable stabilisers such as plant polyphenols.

References

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