Effect of Eggshell Membrane on Inhibiting Food Discoloration

Matsui, Chika
Maeta, Chizumi
Tabara, Saori

Unless ruptured, eggshell membranes (ESM) prevent eggs from spoiling at room temperature. Based on this protective function of the contents of an egg by ESM, we assumed it could also potentially be used to prevent the deterioration of other foodstuffs. We therefore assessed the application of ESM as a food additive for preventing the discoloration of processed food. We set up two food-discoloration experiments using avocado, as food discoloration due to enzymatic browning by tyrosinase occurs quickly in avocado. First, the pulp surface was covered with ESM and the rate of discoloration was assessed visually. The results showed that ESM limited the rate and extent of discoloration of the exposed avocado flesh. Next, by exploiting the adsorption properties of ESM, a water-soluble organic pigment was added to ESM and the experiment was repeated. Once again, it was confirmed that the adsorbed organic pigments inhibited food browning. To clarify the reasons underlying these results, tests of tyrosinase activity in the presence of ESM components were performed; the results showed a well-defined reduction in tyrosinase activity. In conclusion, ESM was shown to have the following three characteristics: melanin adsorption, storage and release of adsorbed additives, and an ability to elute organic colloidal components of the ESM in water; the inhibition of food discoloration in these experiments is attributed to these three related functions. In addition to the development of preservation agents, ESM is expected to be used as a non-toxic additive in cosmetics.

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