

Effect of half-dry processing on umami components of vegetables and mushrooms

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Abstract

Half-dried vegetables and mushrooms in sunlight has recently been recommended by cookbooks and internet sites in order to improve umami taste, despite very little scientific evidence. To verify their saying we chose squash whose umami taste had been observed previously by sensory evaluation to become significantly more prominent than those of the undried samples; further, we investigated the effect of sunlight on the levels of umami components in dried squash. We analyzed glutamic acid (Glu) and aspartic acid (Asp) levels after drying in sunlight, shade, and warm air by high performance liquid chromatography (HPLC) or liquid chromatography-tandem mass spectrometry (LC-MS/MS). Simultaneously, irradiation using visible (VIS), ultraviolet (UV), and far-infrared (far-IR) wavelengths that constituted the sunlight was used to examine the effect of each wavelength field on the levels of Glu and Asp in the squash samples. In addition, to investigate the effect of half-dry processing on the umami taste of vegetables and mushrooms, we assayed 22 other samples after drying in sunlight, shade, and warm air. As a result, the Glu levels of squash in the warm-air-dried group decreased significantly compared to the control group and the shade-dried group. The Asp level in the sun-dried group decreased significantly as compared to the control group. VIS radiation (26.6 W, 24 h) decreased the Glu levels and increased the Asp levels in the squash samples. UV-A radiation (10 W, 24 h) to the squash samples showed no significant effects. When the squash samples were subjected to far-IR radiation with high energy (300 W, 0.5 h), the Asp levels decreased. These far-IR results for Asp were the same as those for the white mushroom and radish samples. From the results of assay tests with 22 samples, Glu levels increased significantly in spinach, zucchini, and shiitake mushroom samples dried in the sun, whereas the other samples exhibited a significant increase or decrease in Glu levels when dried in the sun or shade. These findings indicated that the half-dry processing of vegetables and mushrooms in sunlight does not always improve the umami taste; however, some species might show an increase in the umami components. A more detailed examination is needed to elucidate each condition for the augmentation of umami.

Keywords : half-dried vegetables, umami-taste components, UV, VIS, far-IR

I Introduction

Dry processing of food is a popular processing method used all over the world. In Japan, we have traditionally used dried radish, shiitake mushrooms, and other vegetables for improving preservation to prepare dishes like 'kiriboshi-daikon' and 'hoshi-shiitake'. Recently, the half-dry processing method has been featured extensively in the mass media, wherein an appropriate amount of moisture is retained without

complete dehydration. Completely dried food like 'kiriboshi daikon' must be reconstituted by soaking in water for use in cooking, while half-dried food increases cooking efficacy because of the decreased moisture content present in the food. Mass media say that cooking with vegetables that have been half-dried in sunlight is recommended because of the improved umami taste. However, most information about these foods is anecdotal with negligible scientific evidence regarding the effect of half-dry processing in sunlight on