

## Reduction in Unpleasant Odor and Functional Enhancement of Germinated Brown Rice by Saline Immersion

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### Summary

**Purpose:** This study aimed to determine the effective concentration of saline that causes reduction of the unpleasant odor of brown rice (Experiment 1), the effective concentration of saline that causes an increase in the gamma-aminobutyric acid (GABA) content while enhancing the antioxidant capacity (Experiment 2), and the optimal concentration that leads to unpleasant odor reduction while enhancing the functionality (Experiment 3). The study results will lead to the development of new processing technology to enhance functionality without impairing the flavor of brown rice that utilizes salt.

**Methods:** In Experiment 1, brown rice, “Koshihikari,” was immersed in 0 to 30 w/v% saline and allowed to stand at 30°C for 24 h. The saline concentration, turbidity, and sensory characteristics of the immersion liquid, the water content of brown rice, and the composition of the odorous component of the brown rice were evaluated. In Experiment 2, brown rice was sterilized with hypochlorous acid, immersed in 0 to 30 w/v% saline and allowed to stand at 30 °C for 24 h. The amino acid content, water-soluble/lipophilic antioxidant capacity (water-soluble: 2,2-diphenyl-1-picrylhydrazyl (DPPH)/hydroxyl radical antioxidant capacity (H-ORAC) methods, lipophilicity: lipophilic (L)-ORAC method), and total polyphenol (TP) content were evaluated. In Experiment 3, brown rice was immersed in 0, 1, and 5 w/v% saline, allowed to stand at 30 °C for 24 h, and cooked; the sensory characteristics were evaluated. In addition, brown rices, “Koshihikari”, “Kinuhikari,” and “Kamiakari,” were sterilized and immersed in 0, 1, and 5 w/v% saline and allowed to stand at 30 °C for 24 h. The amino acid and TP contents and water-soluble antioxidant capacity were evaluated.

**Results and Conclusion:** From Experiment 1, the saline concentration was the same before and after the saline treatment. Turbidity and water content considerably decreased after not less than 5 w/v% and not less than 10 w/v% saline treatment, respectively. The sensory characteristics evaluation confirmed unpleasant odor and cloudiness of the immersion liquid after 0, 0.5, and 1 w/v% saline treatment and reduction of the unpleasant odor after  $\geq 5$  w/v% saline treatment. In addition, 16 odor-related components showed a significant decrease after not less than 5 w/v% saline treatment.

As results of Experiment 2, the contents of GABA, alanine, and other compounds showed a maximum value after 1 w/v% saline treatment and decreased considerably thereafter. However, the glutamic acid content decreased with increasing saline concentration. The H-ORAC value significantly increased for all saline solutions compared with that for 0 w/v%; however, no significant change was observed in the L-ORAC value. The