

# **Influences of Superheated Steam Roasting and Water Activity Control as Oxidation Mitigation Methods on Physicochemical Properties, Lipid Oxidation, and Free Fatty Acids Compositions of Roasted Rice**

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## **Abstract**

The feasibility of using superheated steam roasting and wetting to control the water activity in an optimal range to mitigate oxidation of roasted rice was evaluated. Changes in the bed temperature as well as rice kernel moisture content, water activity, and color were monitored during fluidized bed roasting with superheated steam and hot air at 170, 190, and 210 °C. Air-roasted rice was rewetted to raise its water activity to 0.30 to 0.35. All the samples were analyzed for the total oil content, peroxide value (PV), thiobarbituric acid (TBA) value, and free fatty acids (FFA) content and compositions. Higher roasting temperatures, especially at 210 °C, led to a significant increase ( $P \leq 0.05$ ) in the total oil content of the roasted rice. Wetting led to a significant ( $P \leq 0.05$ ) decrease in the TBA value of the air-roasted rice, although the total FFA content significantly ( $P \leq 0.05$ ) increased. Rice roasted in superheated steam at 210 °C exhibited significantly ( $P \leq 0.05$ ) lower PV and TBA value; their total FFA content also tended to decrease, which is desirable for a longer shelf life.

Keywords: color, free fatty acids, lipid oxidation, oxygen, temperature evolution, wetting