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（書込厳禁）

Evaluation of high thermal-oxidative stability of rice bran oil (RBO) via classical and modern mass spectrometric methods

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[Purpose] RBO has been believed to have better thermal-oxidative stability than other edible oils (e.g., palm oil (PO) and soybean oil (SO)). In this study, we investigated deeply why RBO become stable compared to PO and SO under the thermal oxidation by evaluating oil oxidation products using both classical analytical and modern mass spectrometric techniques. Effect of antioxidant agents on the oxidative stability of the oils was also evaluated.

[Method] RBO, PO, and SO were dispensed in 20 g aliquots and heated at 140°C by using heat block and sampled at 0, 0.5, 1, 12, and 24 h. Oil samples were evaluated by conductometric determination method (CDM) and high-performance liquid chromatography-tandem mass spectrometry (LC-MS/MS). For antioxidant agents, γ-oryzanol (OZ) and vitamin E were analyzed by the LC method.

[Result] Based on CDM value, PO has shown to have an unstable profile under thermal condition, since it decreased significantly during the thermal oxidation even though it has the highest CDM value on the initial state. In contrast, RBO has better stability, considered from its CDM value that was higher than SO. From this finding, we explored more about RBO and SO's triacylglycerol (TG) hydroperoxide by using LC-MS/MS. We found that RBO has significantly lower TG containing linoleic (LA)-hydroperoxide and linolenic (LnA)-hydroperoxide than SO. TG containing oleic (OA) hydroperoxide in RBO was also still lower than in SO, despite the OA content in RBO is higher than in SO. OZ in RBO has a tendency to help suppressing the increase rate of TG hydroperoxide and the decrease rate of vitamin E in the oil. Based on these findings, the lower content of TG hydroperoxide (perhaps especially TG containing LA hydroperoxide and LnA hydroperoxide) and the presence of OZ would help RBO to maintain its thermal-oxidative stability.