OXIDATION OF MACADAMIA NUTS

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M.Sc. (BIOTECHNOLOGY)

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ABSTRACT

Doi Tung Macadamia nuts contain a considerable amount of unsaturated fat (>75%). Therefore, oxidation of unsaturated fat possibly occurs and causes off-flavor or rancidity when the nuts are improperly stored or stored for a long time. The aim of this study was to investigate the factors related to this reaction such as free fatty acid content, fatty acid profile, total phenolic compound, enzyme activity, post-harvest processing, sizes of macadamia kernels, and duration storage prior to processing. Moreover, the effects of the roasting process on oxidative stability were studied. Thiobarbituric acid reactive substances (TBAR) measurement and Sensory Quantitative Descriptive Analysis (modified QDA) were used to monitor the lipid peroxidation.

Post-harvest processing of macadamia nuts had no effect on lipid oxidation, although total phenolic content decreased after cracking. The size of the macadamia kernel had an effect on lipid oxidation. Chips were prone to oxidize more than whole kernels. Raw kernels that were stored for two weeks might have lower oxidative stability than these stored for six months. TBAR values of roasted kernels that were stored for two weeks were higher than those stored for six months but their QDA scores were not significantly different. Lipoxygenase and lipase were still active after the roasting process. Therefore, lipid oxidation occurred even during roasting at a high temperature (135 °C). If vitamin E acetate (0.01%) was added, it could not prevent or retard lipid oxidation on macadamia kernels as expected. Therefore, roasted kernels should have a moisture content at the appropriate level (1.5%) and be packed in aluminium foil pouches under nitrogen atmosphere to prevent light and air from entering. An analysis of volatile compounds by Solid Phase Microextraction (SPME) indicated that hexanal, heptanal, octanal, nonanal, decanal, 2-heptenal, 2-octanal, 2-nonenal, and 2-decenal were affected by lipid oxidation.

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