THE QUALITY OF HIGH-PRESSURE-INDUCED AND HEAT-INDUCED HYUGA-NATSU MARMALADE

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Hyuga-natsu is a typical Japanese citrus with desirable smell and edible albedo. The objectives of this study are to establish a process for pressure-induced marmalade, compare it with heat-induced marmalade, and to investigate the softening of peel during soaking in citric acid, heating or pressurization. Albedo, segment wall and juice sacs of hyuga-natsu were homogenized with citric acid solution (pH 2.7) and mixed with sliced flavedo. Then it was soaked for 24 hrs at pH 2.7. Sucrose was then added (final sugar 50%), vacuum packed, then pressurized for 30 min at 500 MPa or boiled for 10 min, respectively. The firmness of flavedo and rheology of marmalade were measured. Sensory evaluation of marmalade was compared using a five point scale. Also, the amounts of pectin and naringin in four parts of hyuga-natsu were measured. Changes in texture and structures when soaked, pressurized or boiled were also measured. Firmness of peel was (greatest to least); pressurized > soaked > boiled. The cell walls of flavedo and albedo did not loosen after pressurization. However, after soaking or heating, the middle lamella of albedo separated. The amount of pectin was greatest in albedo > flavedo > endocarp > juice sacs, respectively. Water-soluble pectin and naringin were found to be slight in all parts. The peel of high-pressure-induced marmalade maintained a natural color. However, a great difference in viscosity between heat-induced and high-pressure-induced marmalade was not found. High-pressure-induced marmalade was evaluated better than heat-induced marmalade by a sensory test.