Chemical Properties and Sensory Analysis of Equivalently Roasted Peanuts using an Industrial Relevant Roaster

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In industry, peanuts are roasted to a specific surface color for quality control; however, different temperature/time combinations can be used to achieve equivalent surface colors but different chemical and sensory properties related to product quality. In a previously published paper, our lab examined the chemical/sensory properties of peanuts roasted by a lab scale oven with single layer peanut loaded and no forced air flow. Such work can be extended to a simulated industrial roasting using a pilot plant scale roaster that introduces the control of air flow direction, air flow rate, and bed depth. To investigate this potential, jumbo-size runner peanuts were systematically roasted under 5 temperatures (149, 163, 177, 191, and 204 °C) to Hunter L- values of 53 ± 1, 48.5 ± 1, and 43 ± 1, corresponding to light, medium, and dark roasting, respectively. The temperature profiles suggested low temperature/long time roasting featured in an isothermal phase, while high temperature/short time characterized by an outstanding come-up phase throughout the roasting. Moisture contents (MC) decreased from initial 7.97% to 1.60- 0.74% after roasting. At equivalent temperatures, MC decreased as roasting intensity increased. Total tocopherol contents of expressed oil depended on both temperature and roasting levels, and were linearly associated with moisture content ($R^2$=0.78). Peanuts roasted at lower temperatures and darker colors had higher tocopherol contents. The highest glucose and fructose contents were observed from medium roasted peanuts, while there was no effect of roasting level on the contents of inositol, sucrose, raffinose, and stachyose. Yield stress, as a measure to assess the spreadability of peanut paste, was conducted to evaluate the food quality and consumer acceptance. Results showed that dark roasted peanut paste possessed a higher yield stress than light and medium roasted samples, while there was no significant difference between the light and medium. Sensory analysis suggested the medium roasted peanuts were significant higher in roasted peanutty (RP) than the light (p=0.0075) and dark (p<0.0001) roasted peanuts, and the light was higher in RP than the dark (p=0.0257). Within the medium group, the higher temperature/shorter time roasting schedule was more likely to obtain higher RP and sweet aromatic with less bitter, astringency, and flavor off notes.