

Title Characterization of naturally occurring fruity fermented off-flavor in peanuts using descriptive sensory, consumer and instrumental analysis

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Abstract

Fruity fermented (FF) is a common off-flavor found in peanuts and is developed when peanuts are cured at excessive temperatures ($>35^{\circ}\text{C}$). The peanut plant has an indeterminate flowering pattern meaning a range of maturities are present at harvest. Immature peanuts tend to have more FF off-flavor, roast darker, and have a faster flavor fade compared to mature peanuts. The objectives of this research were to: (i) characterize the relationship of FF off-flavor with other attributes, (ii) characterize consumer's perception of FF off-flavor, (iii) measure the variability and determine the FF distribution in bulk lots, and (iv) identify the volatile compounds responsible for naturally occurring FF off-flavor using sensory and instrumental analyses. Descriptive sensory results varied among the 20 different lots and the results indicated that there is an inverse relationship between roasted peanut flavor and FF off-flavor. Consumer studies indicated that differences were detected between the non-FF and FF samples when the line scale, the most sensitive method, was used. The presence of this off-flavor negatively impacted consumers overall acceptance of peanuts. The distribution of FF off-flavor in large peanut lots was highly variable within and among lots. Data generated in this study was used to develop a sampling plan to determine the true lot intensity of FF off-flavor within a bulk lot. Solvent assisted flavor evaporation (SAFE), solid phase microextraction (SPME), gas chromatography-olfactometry (GC-O), gas chromatography-mass spectrometry (GC-MS), and model systems were done to identify the compounds responsible for naturally occurring FF off-flavor. The results indicated that the esters previously reported as causing FF off-flavor were not detected in natural FF samples by SAFE; however, they were present in natural and artificially FF samples by SPME. Ester concentrations were lower in the natural FF samples compared to the artificially created samples. Model systems across a concentration range of esters and acids produced flavors similar to natural and artificially created FF samples indicating a relationship or continuum. The results of this project determined that there are flavor and volatile differences between natural and artificially created FF samples in different growing regions of the U.S.