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Evaluating standard procedures for instrumental textural analysis of steamed potato: Relationship with sensory parameters

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Consumer preference for boiled potato in Uganda has been assessed to be prevalently based on soft (hardness) and mealy texture. However, harmonised standard procedures have not been hitherto developed to characterize the texture of boiled potato instrumentally in SSA. The RTBBreeding© project focussed on developing discriminant and sensory-correlated procedures based on comparative analyses of Extrusion, Penetration and Texture Profile Analysis (TPA) techniques for mid-throughput evaluation of texture of steamed potato from potato varieties. Tubers of nine popular landrace varieties cultivated in Kabale and Rakai districts of Uganda were used. The tubers were cut into 25 mm cubes, steamed for 15 min in banana leaves and analysed using a calibrated TA-XT texture analyser under standard conditions (Extrusion: test speed 1 mm s^{-1}, strain 80 %, 5-blade grid Ottawa cell; Penetration: test speed 1 mm s^{-1}, distance 10 mm, 60° cone probe; TPA: test speed 1 mm s^{-1}, distance 5 mm, wait period 5 s, 75 mm cylindrical plate) at about 25 °C. For descriptive sensory analysis, twenty random tubers from each variety were steamed for 40 min and evaluated in duplicate by trained panellists for eleven selected sensory parameters on a 11-point scale ranging from 0 (minimum intensity) to 10 (maximum intensity). Results show that Area under curve/Extrusion work (73-236 N.mm), Maximum force/ hardness (6-17 N), and End force (6-15 N) were the more discriminant textural parameters for extrusion. Maximum force, End force and Extrusion work significantly correlated with sensory Moisture release and Hardness by hand. The discriminant textural parameters for penetration were Area under curve/ Penetration work (6-21 N mm) and Maximum force/ hardness (2-6 N). Significant correlations exist between penetration Hardness and Area under curve and the sensory Hardness by hand, fracturability, cohesiveness, and smoothness. Finally, the more discriminant textural parameters for TPA were Hardness (20-52 N), Gumminess (5-19 N) and Chewiness (5-18 N). There are significant correlations between TPA Adhesiveness and sensory moisture release and mealiness. Among the methods, the penetration method was more preferred as it correlated most with sensory evaluation, while TPA was least correlated with sensory.

Keywords: Extrusion, sensory analysis, steamed potato, texture profile analysis

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