The sensory analysis team at NARO in Kawanda

Sensory analysis for potato and sweetpotato

Sensory analysis is a scientific discipline that employs human senses to evaluate different products including food. It is broadly categorized into affective and analytical tests.

The aim of affective sensory analysis is to assess consumer perception and attitudes towards a product thus evaluating acceptability and preferences. Analytical sensory evaluation applies discriminative and descriptive methods to differentiate between products. The descriptive methods provide more information regarding the differences between products by using trained panels to quantify the intensities of the sensory attributes associated with a product.

1. What is the problem?

Sweetpotato and potato breeding programs have introduced highly nutritious varieties with superior agronomic characteristics in an effort to end hunger, malnutrition and increase food security. These efforts have been challenged by low dissemination and adoption rates of these new genotypes by farmers and consumers. In this context, understanding sensory attributes is crucial for improving the acceptability of any new sweetpotato and potato varieties in the market and should be a major area of focus in demand-led breeding efforts.

2. What do we want to achieve?

Historically little attention has been given to consumer perception of sensory attributes in potato and sweetpotato breeding work. But more recent efforts are focusing on consumer preferences for flavor and texture in the hopes of driving consumption rates higher for nutritious crops.

We have begun work to characterize the sensory attributes of sweetpotato and potato genotypes through descriptive sensory analysis. Breeders can use this information to produce varieties that will find more success in the marketplace.

Dr. Suzanne Johanningmeier washes sweetpotato roots prior to testing

A panelist evaluates boiled sweetpotato for taste and texture

3. Who are we working with?

We work with a trained panel established under the Food Biosciences and Agribusiness Innovations Program of the National Agricultural Research Laboratories in Uganda's National Agriculture Research Organisation (NARO). The panel was established in 2018 and comprised of male and female staff at the research station from different professions. They were screened for sensory acuity (e.g., basic tastes, ranking tests, odor recognition test), and commitment and availability to participate in the activities. To monitor and recruit new panelists, the panel is screened for sensory acuity regularly. The group evaluates not only potato and sweetpotato, but also a variety of root and tuber crops such as banana and cassava, among others.

4. What have we achieved and how did we do it?

With the trained panel at NARO, we have established lexicons for boiled potato1 boiled sweetpotato along with standardized scales for scoring various attributes through quantitative descriptive sensory analysis (QDA). The panelists are regularly trained and engaged in sensory analysis activities to monitor and consistently improve their performance. In this way, we have a reliable panel that is always ready to evaluate samples as they come in from the breeders.

5. What's next?

We are working to develop instrumental analytical methods (e.g., Near-infrared spectroscopy texture analyzer) and identify parameters that correlate with sensory analysis to improve the efficiency of breeding selection, especially during early stages. We are also working to create links between consumer sensory preferences and perceptions to descriptive sensory analysis to produce more meaningful recommendations to breeding programs.

6. Who are our partners?

We work in partnership with:

- Food Biosciences and Agribusiness Innovation Program, National Agricultural Research Laboratories, National Agriculture Research Organization (Kawanda, Uganda)
- French Agricultural Research Centre for International Development (CIRAD) (Montpellier, France)
- Department of Food, Bioprocessing and Nutrition Science, North Carolina State University (Raleigh, USA)

References

Mudege, N. N., Mayanja, S., Nyaga, J., Nakitto, M., Tinyiro, S. E., Magala, D. B., Achora, J.C., Kisakye, S., Bamwirire, D., Mendes, T., & Muzhingi, T. (2020). *Prioritising quality traits for gender-responsive breeding for boiled potato in Uganda.* International Journal of Food Science & Technology. https://doi.org/10.1111/ijfs.14840

The research team wishes to thank the following for their technical support in this research:
Department of Food, Bioprocessing and Nutrition Science, North Carolina State University, Raleigh, NC, USA
United State Department of Agriculture (USDA), Agricultural Research Services (ARS), Food Science and Market Quality and Handling Research Unit, Raleigh, NC, USA
CIP thanks all donors and organizations that globally support its work through their contributions to the CGIAR Trust Fund. https://www.cgiar.org/funders/