

Evaluation of two tomato crosses and their parents with a sensory panel and analytical measurements

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Tomato is the most popular vegetable in Germany and it is one of the most consumed horticultural crops in the world. Tomatoes have high nutritional value as they are rich in vitamins and antioxidants. At the same time, consumers are not satisfied with the taste of fresh tomatoes and complain about their poor flavor. Conventional breeding programs have mainly focused on yield, firmness, and long shelf-life, which may have caused a decrease in flavor acceptance. In recent decades, consumer preferences have changed towards sustainable products with an increased focus on the sensorial quality of the products. The flavor of the tomato is a complex interaction of taste and aroma. Volatile aroma compounds define the typical flavor of the tomato. Major contributors to the taste of tomatoes include sugars and acids. The amounts of sugars and acids not only influence the taste but also the overall flavor of tomatoes and are, therefore, important parameters for consumer acceptance. The concentrations of sugar and acid and their ratio in the fruit are determined by the cultivar and environmental conditions. Within the PETRA^{q+n} project (participatory development of quality tomatoes for sustainable regional

production), the goal is to create a scientific basis to breed tomato cultivars with improved quality and optimal adaption for sustainable regional and urban production in Lower Saxony. During the summer of 2018, two tomato crossbred offspring in the F₄-generation and their parents were cultivated in an organic low-input production system. The evaluated crosses were combinations of parental cultivars with high yield and good quality parameters, which showed positive results in breeding sensory evaluation and analytical measurements in the first experimental year in 2017. A trained sensory panel evaluated important fruit quality attributes such as color, sweetness, sourness, skin strength, and fruit juiciness. The sensory results were compared with results of the physio-chemical analysis of total soluble solids (TSS), titratable acidity (TA), texture, and color measurements. The present study compares the quality traits of the crosses and their parents with a trained sensory panel and shows whether the results of analytical measurements reflect the results of the human senses and whether the crosses show improved quality attributes compared to their parents.