Abstract

To better understand puncture injury susceptibility of tomatoes during handling, the relationship between micromechanical properties (e.g., rupture stress and rupture strain) of different sections of the tomato pericarp (cuticle, epidermis, hypodermis, and parenchyma) and the microstructure of tomato pericarp of 2 tomato cultivars were determined at harvest and after 14 days of storage. Different sections of the tomato pericarp were isolated before determining their strength using a universal testing machine. Additionally, resin sections of the pericarp tissue were evaluated with light microscopy to determine their geometrical properties. Significant differences between both tomato cultivars were found for the thickness of the cuticle and hypodermis layers, the perimeter of the epidermis cells embedded with cuticle, as well as the cell shape of the hypodermis layer. Additionally, significant differences were found in the micromechanical properties of the different sections of the tomato pericarp. The difference in the microstructural organisation of both tomato cultivars seems, therefore, to influence the strength of the tomato pericarp, which plays a role in the puncture injury susceptibility of different tomato cultivars. During storage, puncture injury susceptibility increases as the rupture stress of the skin and the thickness of the cuticle decrease as well as the proportion of embedded perimeter of the epidermal cells decreases.