

Title Physical and mechanical properties of tomato fruits as related to robot's harvesting
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Abstract

In order to better design, fabricate and control tomato harvesting robot, selected physical properties such as height, diameter, sphericity, surface area, volume, total mass, mass of pericarp and gelatinous matter, bulk density, density of pericarp and gelatinous matter, porosity, projected area, shape factor, and radius of curvature of two cultivar tomato fruits with different locule numbers were mainly investigated by image analysis and water displacement method. Mechanical properties such as friction and rolling resistance coefficients, and rupture energy, rupture force, compressibility, and loading slope of tomato fruits at two loading positions were determined by pull and loading test. Results showed the locule number had a significant effect ($P < 0.05$) on certain physical and mechanical parameters, such as height, diameter, surface area, rupture force, compressibility, and friction coefficient. The loading position also showed a significant effect ($P < 0.05$) on certain mechanical parameters, such as compressibility. The obtained properties are closely related to robot's harvesting.