

ABSTRAK

Hasil pertanian khususnya tomat sering mengalami kerusakan akibat gaya mekanis pada saat pemanenan, transportasi, sortasi dan penyimpanan, akibat penggunaan mesin pertanian kerusakan mekanis ini dapat meningkatkan limbah pasca panen. Untuk mengurangi kerusakan tomat selama penanganan, beberapa sifat seperti sifat fisik, mekanik, hidrodinamik dan reologi sangat penting, sebagai acuan dalam perancangan mesin dan penanganan pascapanen. Penelitian ini bertujuan untuk menganalisis pengaruh kematangan dan ukuran buah tomat terhadap perubahan sifat fisik (dimensi dan warna), sifat mekanik (*Poisson ratio*, *angle of wall friction* dan *adhesion force*), sifat hidrodinamik (*drag coefficient*, *drag force*, *buoyancy force* dan *terminal velocity*), dan sifat reologi (*creep test* dan *Burger's model*) tomat Servo F1 selama penyimpanan 14 hari. Konstanta Burger's model adalah *instantaneous deformation* (J_0), *elastic deformation* (J_1), *viscous deformation* (η_0) dan *time retardation* ($Tret$). Beban yang digunakan dalam *creep test* adalah 30 Newton selama 30 menit, dengan rata-rata nilai *Poisson ratio* sebesar 3,44. Nilai *drag coefficient* buah tomat diperoleh 0,44. Tingkat kematangan berpengaruh nyata terhadap perubahan sifat fisik (dimensi dan warna), sifat mekanis (*angle of wall friction* pada permukaan triplek dan *adhesion force*), sifat hidrodinamik (*Poisson ratio*, *angle of wall friction* dan *adhesion force*), dan sifat reologi (luas permukaan kontak, *instantaneous deformation*, *elastic deformation* and *time retardation*). Ukuran buah tomat memiliki pengaruh terhadap perubahan sifat fisik yaitu pada dimensi buah, sifat mekanik yaitu pada *adhesion force*, sifat hidrodinamik dan reologi pada adalah *instantaneous deformation* dan *viscous deformation*. Ditemukan bahwa interaksi kedua variabel mempengaruhi perubahan sifat fisik (dimensi), sifat mekanik (*angle of wall friction*, *adhesion force* pada *stainless steel*), sifat hidrodinamik (*buoyancy force*) dan sifat reologi (bidang kontak tomat).

ABSTRACT

Agricultural products, especially tomatoes, often experience damage due to mechanical forces during harvesting, transportation, sorting and storage, due to the use of agricultural machinery, this mechanical damage can increase post-harvest waste. To reduce damage to tomatoes during handling, several properties such as physical, mechanical, hydrodynamic and rheological properties are very important, as a reference in machine design and postharvest handling. The objective of this research is to analyzed the effect of the maturity and size of tomatoes on changes in physical properties (dimension and color), mechanical properties (Poisson's ratio, angle of wall friction and adhesion force), hydrodynamic properties (drag coefficient, drag force, terminal velocity and buoyancy force), and rheological properties (creep test and Burger's model) of Servo F1 tomatoes during 14 days storage. Buger's model constants are instantaneous deformation (J_0), elastic deformation (J_1), viscous deformation (η_0) and time retardation (T_{ret}). The load used in the creep test was 30 newtons for 30 minutes, with an average Poisson's ratio value of 3.44. The drag coefficient value of tomatoes obtained 0.44. Maturity level has a significant effect on changes in physical properties (dimensional and color), mechanical properties (angle of wall friction on the plywood surface and adhesion force), hydrodynamic properties (drag coefficient, drag force, buoyancy force and terminal velocity), and rheological properties (surface area contact, instantaneous deformation, elastic deformation and time retardation). Tomato size had an influence on changes in physical properties, namely on fruit dimensions, mechanical properties, namely on adhesion forces, hydrodynamic and rheological properties on instantaneous and viscous deformation. It was found that the interaction of the two variables affected changes in physical properties (dimensions), mechanical properties (angle of wall friction, adhesion force on the stainless steel), hydrodynamical properties (buoyancy force) and rheological properties (the contact area of the tomatoes).