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| Title | Modeling changes in rheological properties of potatoes during storage under constant and variable conditions |
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**Abstract**

The changes in rheological properties of potatoes stored at 5, 15, 25 °C and variable (fluctuating) temperature for 16 or 26 weeks were evaluated in terms of elasticity and viscosity parameters using axial compression and creep tests. Cylindrical test specimens (15 mm diameter and 30 mm long) were used. A third-degree polynomial best fitted the force–deformation curves in axial compression test ($R^2$=0.98–0.99) whereas a four-element (Burgers) mechanical model adequately described the creep response of potatoes ($R^2$=0.95–0.99). The tangent modulus of elasticity in axial compression and elasticity and viscosity parameters in creep tests in general decreased significantly ($P$<0.05) with increase in storage time both under constant and variable storage conditions. The changes in rheological properties of potatoes stored under constant storage condition were sufficiently described by a modified exponential model ($R^2$=0.89–0.96) except for the viscosity parameter of the Maxwell component of the four-element model. The logarithm of degradation rate constant, $k$, and the constant, $n$, were linearly related to storage temperature. For the variable storage condition, a bulk mean temperature ($T_{bm}$) was calculated to account for a series combination of storage time and temperature to which the potatoes were subjected. The changes in rheological properties due to variable storage temperature were then described as a function of $T_{bm}$ and storage time, $t_s$, using stepwise multiple regression. The result indicated that except the viscosity parameter of the Maxwell component of the four-element model, it was possible to describe the changes in rheological properties as a function of $T_{bm}$ and $t_s$ ($R^2$=0.84–0.99).