

# 1. Effects of pressure maintenance and strain maintenance during compression on subsequent dimensional stability and density after relaxation of blocks of chopped corn straw

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**Abstract:** Chopped corn straw is a viscoelastic material that can rebound after compression. Pressure maintenance and strain maintenance are two key processes that enhance the dimensional stability of post-compression straw blocks. To study the effects of stabilization processes on the dimensions of post-compression straw blocks, the authors comparatively explored the relationships of strain and stress with time during constant-speed compression (CC), constant-speed compression followed by strain maintenance (CCS), constant-speed compression followed by pressure maintenance (CCP), and constant-speed compression, pressure maintenance followed by strain maintenance (CCPS), and uncovered the reasons for these relationships. The Burgers constitutive model fit well to the data during the pressure maintenance stage ( $R^2 > 0.990$ ), and the effects of pressure maintenance on strain and dimensional stability of post-compression straw blocks were investigated. The Wiechert model B ( $R^2 > 0.990$ ) was the constitutive model that best represented the strain maintenance stage. Additionally, the effects of strain maintenance during CCS and CCPS on relaxation rate and dimensional stability of post-compression straw were compared. The relaxation density of post-compression straw blocks was compared among different stabilization processes. The relaxation density of post-compression straw blocks was the largest after CCPS, followed by CCS and CCP. © 2020, North Carolina State University.

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