**Title** Mechanical damage to apples during transport in wooden crates

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**Citation** Biosystems Engineering, Volume 96, Issue 2, February 2007, Pages 239-248

**Keywords** apple; mechanical damage

**Abstract**

Mechanical forces exerted on apples in wooden crates during the transport period from the harvest to market stage, as well as the damage caused by these forces were determined. Typical wooden crates as specified in Turkish Standard, TS 3766, and widely used in apple transport in Turkey were used in the study. Apples were placed into containers in three layers. Force measurements were made at a total of 21 measurement points. Containers were placed onto free fall, horizontal impact and vibration simulators in the laboratory and the free-fall force in vertical direction, horizontal impact forces in vertical and horizontal directions and vibration forces in vertical and horizontal directions were measured. The means of free fall, horizontal impact and vibration forces were used to calculate the values of mechanical forces acting on the crates during transport. The correlation between mechanical force and damage was linear in both apple cultivars and a significant correlation was found for apple cultivars Granny Smith and Starkspur Golden Delicious, respectively. Significant differences between the damage at the lower and the uppermost layers were observed in both apple cultivars.