

Title Measuring the stresses transmitted during mechanical grape harvesting
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Abstract

The objective was to evaluate the stresses transmitted by machinery during the harvest of grapes that affect the productivity and quality of the work. The evaluation was carried out on two commercial grape harvesters, from the same manufacture, one self-propelled and the other trailed, which differed in the apparatus for detaching, intercepting and handling the product. Each machine was operated to provide the best operating conditions. Measurements of harvest quality, accelerations inside the machines, and accelerations on the plant were carried out. Harvest quality was evaluated by checking the condition of the detached grapes, level of plant defoliation and amount of visible losses. Accelerations inside the machine were evaluated using an instrumented sphere inserted in the product flow during harvesting. Accelerations on the plant were evaluated at the moment of grape detachment, measuring the stresses transmitted by the beating system with accelerometers positioned on the vine shoots.

The results obtained indicate that the productivity of the two machines differed (+50% for the self-propelled), using a comparable work quality. From a preliminary analysis of the action of the beaters on the plants, the two grape harvesters differed in their duration and intensity of the stresses. A more detailed dynamic analysis, considering the Doppler effect and an evaluation of the harmonics obtained with spectral decomposition by means of FFT (Fast Fourier Transform), demonstrated a better energy performance for the self-propelled machine that explained its higher work efficiency.