Development of a test bench for vibration measurements of hand-held harvesters for olives

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**Abstract.** Olives harvesting is the most expansive activity among cultural operations, so its mechanization is essential to reduce production costs. For this reason, especially where full mechanization is not possible due to structural conditions such as low tree density, old trees, irregular spacing, and terraced ﬁelds, which are very frequent in many small Italian farms, the use of hand-held vibrating harvesters is quite wide spread. However, these machines expose the operators to high vibration risks of their hand-arm system, often underestimate by the users themselves, mainly interested in productivity.

The transmission of the vibration and its propagation in the organism through the hand-arm system is a complex phenomenon that involves several factors among which the working conditions (idling or full-load) and the operator characteristics (weight, grip force, ability). So, the assessment of the effective risk requires direct measurement under real working conditions or the deﬁnition of standardized procedures able to provide reliable acceleration values.

Although this need has been known for some time, there is still no a unified regulation for this purpose. Consequently, at the Section of Mechanics and Mechanization of the Department of Agriculture, Food and Environment, a test bench has been developed to simulate the effect of the branches during the measurement of the acceleration produced by hand-held harvesters. In the design of the test bench, the experience carried out with the device developed by Deboli et. al. (2014) has been considered. The test bench has an aluminum frame with a working area of about 1.5×1.5 m positioned at a minimum height of 1.5 m and allows testing all the main models of held-held harvesters available on the market. The working area consists of vertical and horizontal nylon threads with adjustable spacing and tension to simulate the crown of the plant and to provide the load during the test. The threads are stretched by means of springs and simultaneously preloaded by moving a vertical and a horizontal bar of the frame to which the same springs are attached. By fixing the space between the threads and their tension, the load conditions for the machine under test should be almost constant and the measurements should be reproducible over time.

Deboli, R.; Calvo, A.; Preti, C.; Inserillo, M., 2014, Design and test of a device for acceleration reproducibility of hand held olive harvesters. Int. J. Ind. Ergon. 44, 581–589, http://dx.doi.org/10.1016/j.ergon.2014.05.007.