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### DEVELOPMENT OF AN EXPERIMENTAL SYSTEM FOR AGRICULTURAL WORK PROCESS MEASUREMENT

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**ABSTRACT** Agricultural work processes are human labour intensive and usually performed in hostile environments (e.g., humidity, temperature, radiation, low visibility due to occlusions). The processes consisted of complex, non-uniform manual operations which demand from the worker high mobility, accuracy and awareness and were not planned according to production engineering and ergonomics aspects. In addition, the physiological data of the workers such as fatigue or physical and mental workloads were not regarded. This paper presents an innovative experimental system developed for work processes measurements in agriculture. The experimental system consists of three measurement devices: work study device - an IPAQ 1930 PPC platform with dedicated software using C# developed by the authors; environmental and meteorological device – HOBO platform capable of measuring temperature, relative humidity; and, physiological measurement device intended to measure the overall work load by measuring heart rate during each task. All platforms were integrated to a single system and the measured data was synchronized using a PC. The experimental system developed can compare between the data collected with the three subsystems and evaluate the influence of one on another. Experiments were conducted on 8 different workers in a flower farm using the developed system. The results show that the actual system resolution is between 3 to 5 s. analyzing the work processes data collected by the system revealed that although the overall relative physical workload is not high during the day as reflected in the average heart rate there was a significant ( $\alpha < 0.01$ ) negative linear correlation between the production rate and the heart rate and a significant ( $\alpha < 0.01$ ) reduction in the production rate with an increase in the environmental temperature in range of 13°C to 31°C.

**Keywords:** work study, work process, work load, flowers.