Title Remote monitoring of fruit postharvest behavior based on sensor networks

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Abstract

The main objective of the production and distribution chain of fruit is to ensure that the product reaches the consumer in its optimal state of maturation. Prior to commercialization, the fruit stays in cool chambers for a short time. This period has a decisive influence on its final quality. On the one hand, a suitable control of temperature and relative humidity refrigerating methods are essential for refrigerating methods. On the other hand, sensitive information related to maturation (carbon dioxide, ethylene and ethanol) is interesting to be acquired. Nowadays, used methods by packinghouses are too expensive and they only provide samples of the atmosphere in some points of the chamber. Finally, these methods are little exhaustive and are not reliable. IVIA, through the research project Sensogest, is developing an infrastructure capable of acquiring, pre-processing and transmitting information about the atmosphere of the chambers in a packinghouse to remote station. It is based on temperature and relative humidity sensors and gas detectors whose number and location will depend on the particular features of each cool chamber. The developed infrastructure will be applied to the quality control of citrus, peaches and nectarines, due to their great specific weight in the Spanish packinghouse sector. Gas detectors have been developed by IVIA and are based on three Metal Oxide Semiconductor (MOS) sensors. They can work in high relative humidity conditions (bigger than 80%) and have long term stability bigger than one year. Characterization and calibration tests of sensors have been performed in small climatic chambers where it is possible to control environmental parameters and atmosphere composition in order to obtain reference measurements. Gas chromatography-Mass spectrometry techniques (GC-M) have been used due to their excellent sensitivity and selectivity in volatile measurements in order to analyse fruit maturation state analysis. Temperature and relative humidity monitoring system is based on a new sensor that is immune to very common electromagnetic noise in chambers. Finally, an AS-Interface communication network has been developed to transmit processed signals from developed monitoring system to remote station. Performed tests with the developed monitoring infrastructure will be presented and discussed.