

### Abstract:

The final quality of fruit depends on many factors. Since the consumption platforms of fresh produce are usually far from growing areas, the logistics and the infrastructures required to transfer products to the end user are crucial to preserve quality. The handling and marketing phases, with associated temperature and humidity changes during transport and storage, could cause severe water loss, leading to poor appearance and changes of organoleptic characteristics.

Aim of this study is to develop a model for the simulation of the evolution of quality in peach (cv Elegant Lady) fruits from the end of packaging in paperboard trays to shelf. The model has been identified using the measurement of room humidity and temperature, both outside and inside the sample trays (30 fruits each), collected with small data loggers placed along the whole fruit supply network. The proposed model embeds both discrete-events, mainly devoted to the description of logistics and external condition changes, and continuous-time behaviours.

In order to quantify the influence of the transportation and storage phases on the firmness of the peaches, a new index of the firmness of the fruit has been introduced. Such parameter results to be highly correlated with the measures of firmness evaluated on samples during trials. Such estimate is obtained considering the integral of the deficit vapour pressure, the integral of the temperature and the elapsed time of the fruit in the chain, making it a reliable tool to quantify the firmness of the fruits on the base of storage parameters.

The hybrid model can be used to compare different logistic solutions (storage temperature, transportation and storage time, etc.) on fruit packages, predicting quality changes along the supply chain.