Abstract

Objective of this study was to develop an applicable model for describing the shelf life of fruit and vegetables during storage and transport under various conditions and in different packages. Apart from temperature and relative humidity in the surrounding air shelf life of packed products is limited by the airflow around and through the packages, the structure of packages (i.e. size, material, number and dimension of holes etc.), and the position (layer) and the density of the produce in the package. The water losses resp. the rates of transpiration at various temperatures and in different packages allow to calculate the boundary layer resistance (rB) of the stored product, which was used as a basis for shelf life prediction modelling. The boundary layer resistance is a measure for the flow conditions against and around the produce (Linke and Geyer, 2001). Consequently, changes in water status can be analysed independently from environmental conditions. For this, the flow conditions at the surface of the produce are determined using simple measurement techniques. The present study is focused on the determination of the boundary layer resistance in different transport packages. Depending on package size approximately 100 to 150 PE spheres (diameter 45 mm) filled with distilled water and 20% anti-freezer, absorbed in a water retention granulate, were used as homogenous mass bodies to simulate stored products. 12 to 20 of these evaporation devices (30 holes, 2.0 mm diameter on each sphere) were installed in each box between the PE-spheres in various positions. The plastic and cardboard boxes, respectively, were positioned under natural and forced air convection (0.8 m/s). The constant air flow was established by an air flow tunnel. The water loss of the evaporation devices was determined by weighing in 1 h intervals. The results were related to the influencing factors, interpreted and put into the shelf life prediction model. The results showed large differences in the transpiration of produce in different boxes. Especially the position inside the box influences boundary layer resistance.