## Abstract

The objective of this study was to develop and to validate a model for predicting the combined effect of temperature and $a_w$ on the radial growth rate, $\mu$, of *Botrytis cinerea* and *Penicillium expansum* on grape berries. The proposed strategy was based on the gamma-concept developed previously [Zwietering, M.H., Wijtzes, T., de Wit, J.C., van't Riet, K. 1992. A decision support system for prediction of the microbial spoilage in foods. Journal of Food Protection. 12, 973–979]: $\mu = \mu_{opt}.\gamma(T).\gamma(a_w)$, where the gamma functions were cardinal models with inflection (CMI), $\mu_{opt}$ the radial growth rate on grape berries. Firstly, the cardinal temperatures and $a_w$'s were estimated independently from experiments carried out on Potato Dextrose Agar. Secondly, the gamma concept was validated i/ on a synthetic grape juice medium (SGJ) and ii/ on a grape juice agar (GJA). Accuracy and bias factors were closer to 1 with the latter analogue, thus suggesting that GJA should be preferred to SGJ. Thirdly, an experimental protocol taken into account the isotropic nature of fungal growth was developed for estimating $\mu_{opt}$ on grape berries. This study demonstrated that CMI's can be validated on agri-food products over a wide range of temperature and $a_w$ using the described methodology.