

DEVELOPMENT OF PREDICTIVE MODELS FOR QUALITY CONTROL OF CARROTS DURING DRYING

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ABSTRACT

This thesis research project is aimed at setting up prediction models based on NIR spectroscopy, for quality control of organic carrot discs (*Daucus carota* L., var. Romance) during hot-air drying process (horizontal flow) up to 8 h. Hot-water blanching was tested at 95°C for 1.5 min, as pre-treatment to control the occurrence of enzymatic browning during drying. Hot-water blanching had a positive impact on the appearance of the carrot discs.

PLS regression showed good performances for the prediction of a_w (RMSE = 0.04; $R^2 = 0.96$), moisture (RMSE = 0.04; $R^2 = 0.98$), SSC (RMSE = 4.32-4.40 °Brix; $R^2 = 0.88$), carotenoids (RMSE = 21.75-23.10; $R^2 = 0.96$) and changes in color (RMSE = 1.40-1.46; $R^2 = 0.85-0.86$) during drying. Also PLS-DA classification showed very good metrics (total accuracy 92.38%) in recognising 3-drying steps, both for control and hot-water blanched samples. Features selection by iPLS and iPLS-DA algorithms showed results better/equal than models based on full spectrum. For these results, the implementation of low-cost NIR sensors on drier device, seems feasible.

KEYWORDS: carrot, NIR, drying, prediction models, PLS, PLS-DA