

PROGRESS IN DEFINITION AND ASSESSMENT OF ITALIAN SAFFRON QUALITY BY FT-NIR SPECTROSCOPY

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Background

Saffron quality is evaluated on voluntary basis according to ISO 3632, by target methods, to define broad quality categories, thus reducing the premium products recognition. Beyond trading standards, professionals in saffron value chain require non-destructive method to assess the quality characteristics saving the precious product, and the definition of strict and rewarding quality assignment. Thus, the work proposes a subdivision of ISO 3635 I quality category in subcategories, together with the development of a non-destructive analytical method based on FT-NIR spectroscopy for their determination.

Methods

125 samples of Italian saffrons (dry stigmas) were collected along two harvesting years and analysed according to ISO 3632 and by FT-NIR spectroscopy by mean of an integrating sphere. Both datasets were explored by Principal Component Analysis (PCA) to uncover patterns linked to quality categories and sub-categories. Classification models based on FT-NIR data were developed by Linear Discriminant Analysis (LDA) to predict the individuated quality sub-categories.

Results

The work confirmed the excellent quality of saffron: 95% of samples belonged to I quality category (ISO 3632). From the ISO 3632 data exploration (PCA) it was proposed the division of the I category into three sub-categories, mainly based on colouring and flavour strength. The sub-categories individuated (i.e. premium, superior and high-quality) were used as a-priori information to develop the classification models based on FT-NIR data. The LDA model reached high correct classification rate: 94.8% in calibration, 82.3% in cross-validation, and 84.2% in prediction. In particular, none of the premium samples were misclassified as high-quality and vice versa.

Conclusions

In light of these results, the integration of sub-categories in ISO 3632 standards, and the implementation of FT-NIR as non-destructive method is envisioned, being two strategies to improve the recognition of saffron quality, beyond the Italian borders.

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