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Robust Model for On-line Measurement of Moisture and Fat Content of Olive Pomace

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Process control is often neglected in small olive oil mills. The fat content of olive pomaces can vary from 3% to 7%, this may lead to significant losses in olive oil production. As a process analytical technology (PAT), near infrared (NIR) spectroscopy has multi-purpose capacities, speed and is easy to use. This technic is used either with on-line and with benchtop equipment.

In this study one NIR equipment (ASD labspec 4) with an illuminator reflectance lamp was used to analyse olive pomaces from different mills. The equipment was placed online at the exit of the oil extraction and as benchtop equipment with samples place in a cup with diameter of 9.0 cm and thickness of 0.5 cm. The pomace samples were analysed for moisture and fat content by weight lost at 105°C till constant weight, and by Spanish standard UNE 55.030, respectively. A multivariate PLS analysis using the spectra from 1000 to 2400 cm^{-1}, with minimum-maximum normalization allowed to create a single model for the prediction of fat content and moisture of olive pomace in all conditions. 403 samples were used for model calibration and 45 independent samples were used for model validation. Moisture ranged from 52 to 83%, and fat content from 1.5 to 10.2%. The prediction parameters are presented in Table 1.

Table 1. Prediction parameters of developed model.

	Fator	RMSEP	SEP	Bias	Slope	Offset	Correl.
Fat content	5	0.6962	0.7557	0.1549	0.8509	0.7480	0.8685
moisture	7	1.7649	1.8259	0.2129	0.9393	4.5695	0.9631

	SEPCorr	ICM_Slope	ICM_Offset
Fat content	0.6707	0.8864	0.3146
moisture	1.7729	0.9875	0.6886