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METABOLIC CHANGES DURING STORAGE OF RAPESEEDS AND CONSEQUENCES FOR THE QUALITY OF THE RESULTING VIRGIN, COLD-PRESSED OIL

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Rapeseed oil is the most famous edible oil in Germany and a very popular product in the European Union. Virgin, cold-pressed rapeseed oils have a market share of about 5% of the German rapeseed oil market. As low processed products, these oils enjoy a good reputation among consumers. The quality of virgin, cold-pressed rapeseed oils mostly depends on harvest and storage conditions of the rapeseeds. Quality control of these oils is performed by sensory evaluation with a panel of 3-5 trained persons. As this method is a time consuming, personal intensive and sometimes inconsistent procedure there is a need for an analytical support of the quality control. Hence many different of virgin, cold-pressed rapeseed oils were analyzed via dynamic headspace GC–MS to obtain information about the distribution and differences of volatile compounds between sensory good and bad rapeseed oils from the market. Moreover, in two laboratory experiments, rapeseeds were stored under diffe rent humidity and temperature conditions to see which changes occur in seed metabolites and in the volatile compounds of the resulting rapeseed oil. These experiments gave additional information about those factors influencing rapeseed oil quality. In the first approach, seeds were stored on tablets for four days at room temperature under humid conditions. The seeds were spread on tablets and held moistly over the whole day. Germination was visible after one day of storage. The amino acid and glucosinolate composition of the seeds was determined daily using subsamples of the seeds via UHPLC–FLD and HPLC–DAD, respectively. Rapeseed oils were pressed daily and the oil volatile composition was determined via dynamic headspace GC–MS. The amino acid concentrations in seeds rapidly increased over storage time. There was also a clear correlation between rasing indole glucosinolates concentrations in the stored rapeseeds and the "germinated" sensory impression as well as volatile glucosinolate degradation products in the resulting rapeseed oils from the 3rd day of storage on. The second approach was performed with increased seed moisture up to 15%. Seeds were stored in closed plastic boxes over 17 days, one part at room temperature and one part at 30°C. PCA shows a clear shift in volatile compounds of resulting rapeseed oils already at the first day of storage, whereas a decreasing sensory quality was detected at the 3rd day (30°C) and 7th day (room temperature), respectively. Sensory evaluation as well as analytic results show accelerated changes in the rapeseed oil quality and volatile compound concentrations at 30°C-storage. Volatile glucosinolate degradation products rose up clearly to the 3rd storage day, were not influenced by temperature and seem to have no impact on the sensory quality of the oils. Some compounds could be products of bacterial metabolism, as they also were detected in volatile compounds of bacteria extracted from rapeseeds.

Keywords: rapeseed storage, metabolites, volatile compounds, sensory evaluation, virgin, cold-pressed rapeseed oil

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