

Impact of seed germination on the sensory quality of virgin, cold-pressed rapeseed oils

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High quality virgin, cold-pressed rapeseed oils have a typical seed-like and nutty taste and smell. The aroma originates from the composition of the oil ingredients, of aroma-active degradation products of seed metabolites like aldehydes, organic acids, esters or isothiocyanates. The compound composition of the raw material depends on harvest and storage conditions, thus unfavourable conditions like rainy weather during harvest can lead to sensory damage of virgin, cold-pressed rapeseed oils pressed from this raw material. Germination of seeds occurs under increased moisture and natural light conditions and induces numerous metabolic changes. Not each metabolic change in rapeseeds may produce substances that influence the aroma of resulting virgin cold-pressed oils. However, as a typical plant defense reaction of the cabbage family myrosinase enzymes start to degrade glucosinolates when it comes to a seed damage, producing volatile compounds such as nitriles and isothiocyanates. This reaction proceeds during the germination process, but there is a lack of knowledge at which point germination causes sensory damages of the oils and when glucosinolate degradation products are formed.

In this study rapeseeds were stored under increased moisture conditions and nature light at 18°C for four days. Samples were taken at different points in time (minutes 0, 10, 30, 60, 120 and from days 1, 2, 3 and 4). Samples were dried and virgin, cold-pressed oils were produced from each sample by cold-pressing. In parallel the myrosinase activity was detected before and after drying of the seed samples. Sensory description of virgin, cold-pressed rapeseed oil samples was performed according to the standard method of the German Society for Fat Science (DGF) C-II 1 (14). Profiles of the volatile compounds of oil samples were obtained by dynamic headspace GC-MS and aroma-activity of compounds was detected with help of dynamic headspace GC-MS-olfactometry. As expected, myrosinase activity increased in dried rapeseeds over storage time but surprisingly decreased in the not-dried samples. After a seed storage time of 10 min with increased moisture conditions the resulting virgin, cold-pressed rapeseed oils already showed a shift in their sensory quality to a less seed-like and an upcoming woody/strawy impression. Although these changes would not inevitable lead to a sensory damage that causes a failure in quality control processes it shows how fast moisture can accelerate metabolic processes in the raw material. The sensory impression of “germination” or “cabbage”, which is not requested for virgin, cold-pressed rapeseed oils, occurs after a storage time of 2 days under increased moist conditions. This sensory impressions correlate with results of Principle Component Analysis (PCA) of corresponding virgin cold-pressed rapeseed oils, showing a clear differentiation of volatile compounds from fresh samples to samples of 10 min -120 min storage time and from storage days 0 - 2 to storage days 3 and 4.