

P-022: Cold storage impact on the metabolome of open-pollinated onion varieties

Maria Luisa Romo¹, Christoph Weinert², Björn Egert², Matthias Frechen², Bernhard Trierweiler², Marina Häußler², Sabine E. Kulling², Christian Zörb¹

¹Institut für Kulturpflanzenwissenschaften, Universität Hohenheim

²Institut für Sicherheit und Qualität bei Obst und Gemüse, Max-Rubner-Institut Karlsruhe

E-mail: m.romoperez@uni-hohenheim.de

It is difficult to trace the exact origin of onion to a single source. Over time onions have adapted to different climates, temperatures and photoperiods, creating a wide range of varieties and landraces, as well as establishing the species as one of the few with likely worldwide domestication. With the modernization of agriculture, farmers have increasingly focused on growing hybrids and abandoned open-pollinated varieties, leading to genetic erosion. A way to maintain biodiversity is to preserve old open-pollinated varieties. Through their distinct aroma, these plants are again drawing the interest of farmers and consumers alike, making them a viable alternative to commercial varieties and hybrids.

Among the Allium species, the common onion (*Allium Cepa L.*) varies greatly in its storage capacity. While some onion varieties are generally well storables, pre- and post-harvest conditions may also have a major impact on storability. Regarding post-harvest factors, temperature and relative humidity during storage are factors that determine the long-term durability in harvested bulbs. Prolonged onion conservation during a lengthy product-marketing period can be achieved through cold storage, where the bulbs are maintained at 2 – 5°C and medium relative humidity, preventing early sprouting and rooting.

The aim of this study was to assess changes in the metabolite profile of nine open-pollinated varieties and a commercial control variety Sturon after 22 weeks of cold storage.

Before and after storage bulb samples were extracted for the analysis of pungency, non-structural carbohydrates, dry matter, and untargeted metabolite profiling by GCxGC-MS. Through GCxGC-MS, detection and quantification of known and unknown analytes was possible, showing variety, storage or both variety/storage effects.

With the exception of the variety Jaune des Cévennes (progressive *Botrytis* and *Aspergillus* infestation), all varieties demonstrated good storability, minimal water losses and no visual appearance of degradation after 22 weeks of cold storage. Results demonstrated that from the 189 relatively quantified analytes, 75 metabolites exhibited a (significant and relevant) **storage effect**, while a **variety effect** could be observed for 119 metabolites. Mainly monosaccharides, fructans, enzymatically-produced pyruvic acid, and amino acids (with acidic or basic side chain, sulphur-contained compounds and unknown metabolites) were affected during storage. In summary, our results highlight a wide diversity of the open-pollinated varieties of West-Europe. Depending on their composition and in comparison to the control Sturon, most varieties presented high storability without critical quality losses during storage.