The "Breme" red onion: effects of home-storage methods on quercetin and quercetin-glycoside contents

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The "Breme" onion is a red-skinned cultivar growing in the northwest Italy. To date, its nutrient composition has not been described. In this study, we quantified the contents of quercetin (Q) and its glycosides and we studied their stability in the dependence on the local home-storage methods storage at 4°C and freezing. Quercetin-3,4'-O-diglycoside (3,4'-Qdg) was the most abundant form, followed by quercetin-4'-O-diglycoside (4'-Qmg) and Q. We observed the reduction in the contents of all the analysed flavonols after storage at 4°C and after storage in frozen state. No changes have been observed in the ratio Q/3,4'-Qdg + 4'-Qmg, as well as in 3,4'-Qdg /4'-Qmg between the fresh, stored at 4°C, and frozen onions. This could suggest an overall condition of instability, not the activation of a selective deglycosylation pathway. In conclusion, our study shows that the "Breme" onion is mainly rich in 3,4'-Qdg and that home-storage methods do not preserve the stability of some important health-promoting molecules.

Keywords:

Breme onion; home-storage methods; HPLC-MS/MS; quercetin; quercetin glycosides

References:

Arai Y., Watanabe S., Kimira M., Shimoi K., Mochizuki R., Kinae N. (2000): Dietary intakes of flavonols, flavones and isoflavones by Japanese women and the inverse correlation between quercetin intake and plasma LDL cholesterol concentration. Journal of Nutrition, 130: 2243–2250.

Beesk Nina, Perner Henrike, Schwarz Dietmar, George Eckhard, Kroh Lothar W., Rohn Sascha (2010): Distribution of quercetin-3,4′-O-diglucoside, quercetin-4′-O-monoglucoside, and quercetin in different parts of the onion bulb (Allium cepa L.) influenced by genotype. Food Chemistry, 122, 566-571 https://doi.org/10.1016/j.foodchem.2010.03.011

Galdon B.R., Rodriguez E.M.R., Romero C.D. (2008): Flavonoids in Onion Cultivars (Allium cepa L.). Journal of Food Science, 73: C599–C605.

Hollman P.C.H. (2001): Evidence for health benefits of plant phenols: local or systemic effects? Journal of the Science of Food and Agriculture, 81: 842–852.

Kris-Etherton Penny M, Hecker Kari D, Bonanome Andrea, Coval Stacie M, Binkoski Amy E, Hilpert Kirsten F, Griel Amy E, Etherton Terry D (2002): Bioactive compounds in foods: their role in the prevention of cardiovascular disease and cancer. The American Journal of Medicine, 113, 71-88 https://doi.org/10.1016/S0002-9343(01)00995-0

Middleton E.JR., Kandaswami C., Theoharides T.C. (2000): The effects of plant flavonoids on mammalian cells: implications for inflammation, heart disease, and cancer. Pharmacological Reviews, 52: 673–751.

Mogren Lars M., Olsson Marie E., Gertsson Ulla E. (2006): Quercetin Content in Field-Cured Onions (Allium cepa L.): Effects of Cultivar, Lifting Time, and Nitrogen Fertilizer Level. Journal of Agricultural and Food Chemistry, 54, 6185-6191 https://doi.org/10.1021/jf060980s

Pérez-Gregorio M.R., Regueiro J., González-Barreiro C., Rial-Otero R., Simal-Gándara J. (2011): Changes in antioxidant flavonoids during freeze-drying of red onions and

subsequent storage. Food Control, 22, 1108-1113 https://doi.org/10.1016/j.foodcont.2011.01.006

Price Keith R., Bacon James R., Rhodes Michael J. C. (1997): Effect of Storage and Domestic Processing on the Content and Composition of Flavonol Glucosides in Onion (Allium cepa). Journal of Agricultural and Food Chemistry, 45, 938-942 https://doi.org/10.1021/jf9605916

Rhodes Michael J.C., Price Keith R. (1996): Analytical problems in the study of flavonoid compounds in onions. Food Chemistry, 57, 113-117 https://doi.org/10.1016/0308-8146(96)00147-1

Riggi Ezio, Avola Giovanni, Siracusa Laura, Ruberto Giuseppe (2013): Flavonol content and biometrical traits as a tool for the characterization of "Cipolla di Giarratana": A traditional Sicilian onion landrace. Food Chemistry, 140, 810-816 https://doi.org/10.1016/j.foodchem.2012.10.134

Slimestad Rune, Fossen Torgils, Vågen Ingunn Molund (2007): Onions: A Source of Unique Dietary Flavonoids. Journal of Agricultural and Food Chemistry, 55, 10067-10080 https://doi.org/10.1021/jf0712503

Terao J., Kawai Y., Murcita K. (2008): Vegetable flavonoids and cardiovascular disease. Asia Pacific Journal of Clinical Nutrition, 17: 291–293.

Wach Anna, Pyrzyńska Krystyna, Biesaga Magdalena (2007): Quercetin content in some food and herbal samples. Food Chemistry, 100, 699-704 https://doi.org/10.1016/j.foodchem.2005.10.028

Yoo Kil Sun, Lee Eun Jin, Patil Bhimanagouda S. (2010): Quantification of Quercetin Glycosides in 6 Onion Cultivars and Comparisons of Hydrolysis-HPLC and Spectrophotometric Methods in Measuring Total Quercetin Concentrations. Journal of Food Science, 75, C160-C165 https://doi.org/10.1111/j.1750-3841.2009.01469.x