

**European Union Comments on**  
**Codex Circular Letter CL 2017/01/-CPL:**  
**Comments at step 3 on the proposed draft standard for quinoa**

*Mixed Competence*  
*Member State Vote*

The European Union and its Member States (EUMS) would like to submit the following comments:

**(I) General comments**

**Lipid content, fatty acid composition and storage**

The lipid content of quinoa is high in comparison to wheat, rye and barley and amounts to about 6.5% in the whole grain<sup>1</sup>. The unsaturated fatty acids of milled quinoa grain are oleic acid (C18:1 - 25.6%), linoleic acid (C18:2 - 52.0%) and linolenic acid (C18:3 - 9.8%)<sup>1</sup>. That means 87.4% of the total fatty acids are unsaturated and therefore especially broken and damaged grains can be sensitive to lipid oxidation processes.

Therefore, special storage conditions should be recommended to avoid changes in the lipid and protein quality<sup>2</sup> of quinoa or processed quinoa during storage.

**(II) Specific comments**

**3.2.4 Protein content**

**3.2.5 Saponin content**

In scientific literature the composition of raw materials is normally specified on dry weight basis<sup>3</sup>. Otherwise the content of components (e.g. protein and saponin) depends on the moisture content of the quinoa seeds, which can vary significantly.

If a moisture content of 13.5% m/m maximum is allowed as stated in (3.2.1), the limit of the protein content will be > 11.6% on dry weight basis (3.2.4) and the limit of the saponin content will be < 0.14% on dry weight basis (3.2.5).

The limit of the saponin content seems to be very low. Chauhan et al.<sup>4</sup> reported a total saponin content of whole seed, manually dehulled flour and water dehulled flour of 2.05%, 1.05% and 0.32% on dry weight basis, respectively.

### 3.3 Size

The table should be corrected as follows:

Grain size	Range [mm]
Extra large	> 2.0
Large	2.0 -1.7
Medium	1.7 -1.4
Small	< 1.4

### 9. Methods of analysis and sampling

Available	Method	Principle	Type
Moisture Content	ISO 712	Gravimetric	1
Protein Content	ISO 1871	Titrimetry, Kjeldahl	1

The nitrogen-to-protein conversion factors for quinoa described in literature vary from 6.25 to 5.70<sup>4</sup>. They can be calculated from the amino acid composition stated by Chauhan et al.<sup>4</sup>. The conversion factor is slightly different if quinoa proteins from whole ground seed, dehulled seed, bran or flour<sup>4</sup> are tested and it also depends on the variety. However a conversion factor should be fixed for the future.

### Literature

1. H. Ando, Y. Chen, H. Tang, M. Shimizu, K. Watanabe and T. Mitsunaga *Food components in fractions of quinoa seed*
2. *Food Sci. Technol. Res.* 8 (1), 80-84 (2002)
3. L. Abugoch, E. Castro, C. Tapia, M.C. Anon, P. Gajardo and A. Villarroel *Stability of quinoa flour proteins (Chenopodium quinoa Willd.) during storage International Journal of Food Science and Technology* 44, 2013-2020 (2009)
4. L. Alvarez-Jubete, E.K. Arendt and E. Gallagher
5. *Nutritive value of pseudocereals and their increasing use as functional gluten-free ingredients*
6. *Trends in Food Science & Technology* 21, 106-113 (2010)
7. G.S. Chauhan, N.A. M. Eskin and R. Tkachuk *Nutrients and antrinuents in quinoa seed Cereal Chem.* 69(1), 85-88 (1992)