Organic Quinoa Protein

VPO-9762.015GA

Quinoa (pronounced "keenwa") is an Ancient Grain that grows high in the Andes Mountains of Peru and Bolivia as well as the high altitude regions of Colorado, well above the tree line in the purest of environments. This "Noble Grain" was a very important food to the Ancient Incas, and is highly regarded and consumed by health-conscious consumers to this day. Vege Tech Co. uses "Certified Organic" Quinoa grain to produce our Quinoa Protein, therefore ensuring that the product is free of synthetic fertilizers, growth stimulants, GMO and pesticides. We extract the protein and a number of other important molecules from Quinoa utilizing Vege Tech's proprietary enzymatic process.

Description

Quinoa has one of the highest levels of Protein amongst all the world's grains (16.2%). It also contains Vitamins & Minerals such as Calcium (4%), Phosphorous (6.4%) and Iron (6.6%). It's Amino Acid Profile has been characterized as one of the most complete of any plant protein source, and is more like animal protein than a plant protein. The Amino Acid Profile is especially high in Cysteine, Cystine, Lysine, Methionine, Tryptophane and Tyrosine, greatly enhancing its ability to aid in the Conditioning, Repairing and Protection of both hair and skin.

It is commonly known by personal care formulators that proteins of widely differing molecular weights are important for optimum efficacy in Hair Treatment or Conditioning applications. First, very low molecular weight proteins or polypeptides penetrate the hair's cuticle offering significant repair and function as Humectants or Moisturizers. This happens because these molecules are hygroscopic, that is they associate and hold water molecules. The forces responsible for this hygroscopic effect are known as hydrogen bonding.

Secondly, proteins with larger molecular weights greater than 10,000 are excellent Film-Formers, giving the appearance of Shine & Body to the hair. These large molecular weight proteins also effectively repair man made or environmental trauma to the hair such as Split Ends & Lateral Barbs. This repair is accomplished by reattaching the two separated Cuticle layers with a Protein layer between them. Finally, proteins of medium or intermediate sizes have some of the properties of both small and large protein molecules and commonly penetrate the surface of the hair shaft and hold moisture in as well as lay on the hair strand surface and add Shine and Combability.

Vege Tech Organic Quinoa Protein offers a naturally-based ALTERNATIVE to synthetic fixative resins by creating a nice, medium hold to hair spray formulations when used at levels >10%.

Its unique composition is effective as a Skin Hydrating Complex offering a combination of moisture-balancing and film-forming properties that work synergistically to give skin a smoother, more supple feel.

FEATURES & BENEFITS

- Amazing Amino Acid Profile Similar to Animal Protein
- Very High Cysteine / Cystine Content
- Excellent Film Former with a Wide Molecular Weight Range
- Sourced from Pure Environments - Free of Pesticides - GMO
- Harvested using Sustainable & Ecologically Sound Crop Management

Physical Description

One of the ways that hair care proteins attach to human hair is thought to be by disulfide bonds (Protein-S-S-hair). Human hair contains both cystine (hair-S-S-hair) and cysteine (hair-S-H) amino acids. Where (S) represents sulfur. Many proteins, including plant proteins also contain cystine and cysteine amino acids. It has been proposed that when human hair is treated with a protein the following two reactions can take place. These could covalently attach the exogenous protein to the hair.

1. hair-S-S-hair + protein-S-H -> protein-S-S-hair + hair-S-H

2. protein-S-S-protein + hair-S-H -> protein-S-S-hair + protein-S-H

However, a significant portion of the protein deposited on human hair by hair care products is adsorbed on the hair by non-covalent forces. These forces are either ionic or hydrophobic in nature. Adsorbed protein can be washed off[1]. The ionic interaction involves oppositely charged residues on opposing sides of the protein - protein interaction site. Hydrophobic interaction forces involve pairing of hydrophobic amino acids on opposing sides of the protein interaction site. Vege Tech Organic Quinoa protein is replete with both types of residues as well as having a high cysteine and cystine content.

Amino Acid Composition Comparisons

Vege Tech Co. did a study of the abundances of Amino Acids in Organic Quinoa Protein compared to other proteins.

Please note that the study could not locate both cysteine and cystine data for these proteins. The data does exist but standard amino acid analysis procedure converts all the cystine to cysteine prior to hydrolysis and then preserves cysteine during hydrolysis by adding an anti-oxidant such as phenol. However the percentage for cysteine/cystine supports Quinoa Protein very well. Please remember that cystine is the dimmer of cysteine so one cystine equals 2 cysteines.

Amino Acid Composition
Weight %

	Quinoa[1]	Bovine Collagen[2]	Hair Keratin[3]
Cysteine/Cystine	**4.7**	**0.1**	**1.3**
Tyrosine	**5.6**	**1.0**	**0.8**
Tryptophane	**2.1**	**0.6**	**N/D**
Lysine	**12.9**	**4.5**	**3.6**
Methionine	**4.7**	**0.8**	**0.8**

References

1. Soap, Perfume & Cosmetics Quinoa Quality, April 1998
2. Product Information Sheet on Crotein CAA/SF by Croda, Inc.
3. Product Information Sheet on Crotein HKP by Croda, Inc.

Analytical Material

Vege Tech Company has analyzed our Organic Quinoa Protein molecular weights by gel filtration-sizing chromatography using computer controlled HPLC equipped with a Biosep SEC-Z000 300mm X 7.8 mm gel filtration column.

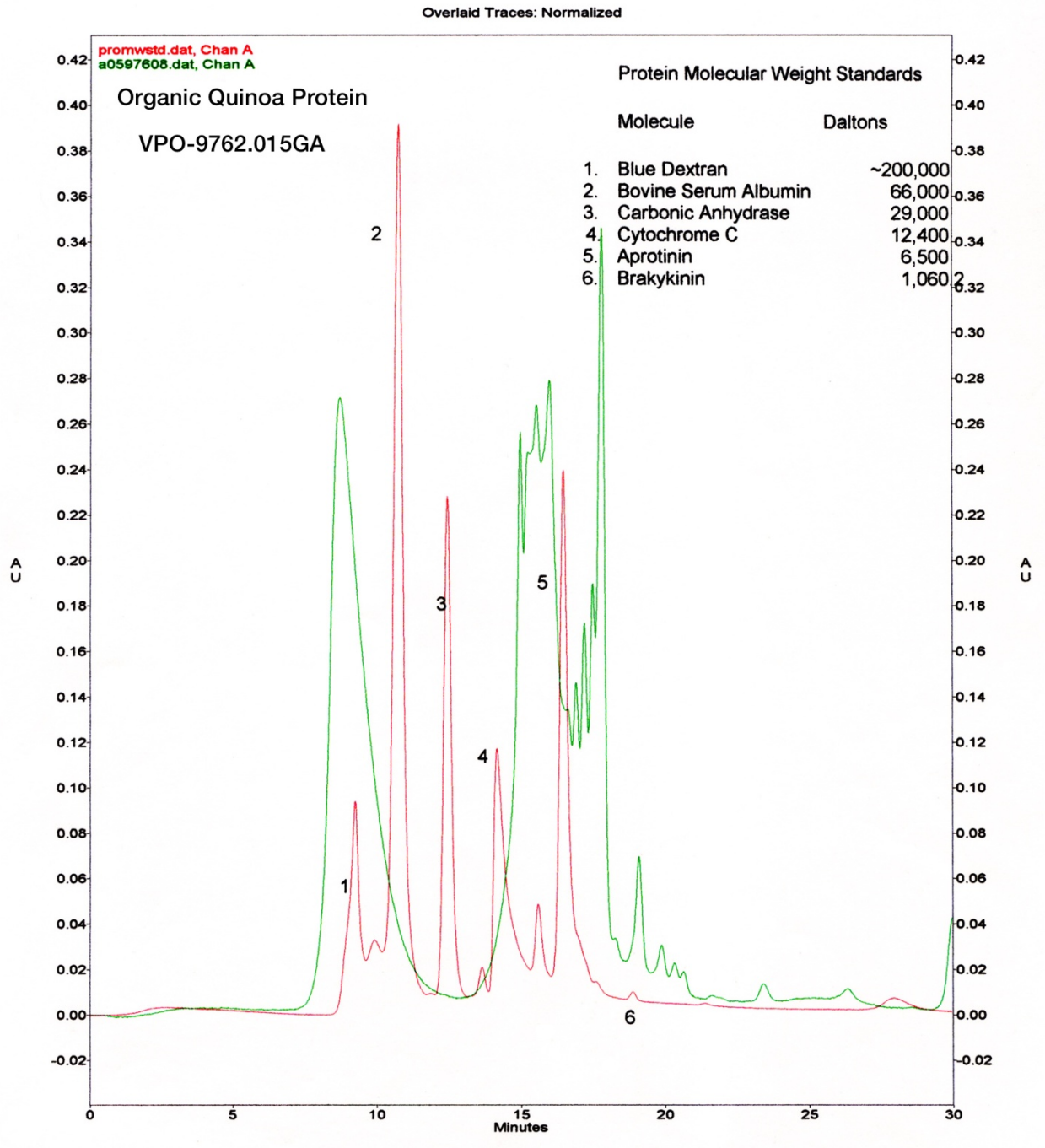
The chromatograms of Quinoa and the molecular weight standards are shown on the following page. The green trace is the Quinoa line. Comparing the Quinoa trace with the red or molecular weight standards line, it can be seen that the molecular weight distribution of Quinoa is unique. It contains significant amounts of each of the three molecular weight ranges discussed above. There is a large amount to protein with a molecular weight maximum at about 200,000 Daltons. This is very large. The chromatogram also shows a large peak at a molecular weight range of 11,000 - 7,000 daltons, these proteins are clearly in the intermediate range. Finally we can see a significant amount of protein in the small range. This range extends all the way down to the dipeptide size of about 300 Daltons.

Vege Tech Organic Quinoa Protein is unique among plant proteins because of its completeness and unique among all cosmetic ingredient proteins because it contains all three of the efficacious molecular weight ranges, not just one or two of the three as most animal proteins.

References

1. Relationship Between Collagen Hydrolysate Molecular Weight and Peptide Substantively to Hair, Journal of the Society of Cosmetic Chemists 42, 35 (1991)

Chromatograph Of Vege Tech Organic Quinoa Protein



INCI:	CAS #:	EINECS/ELINCS:	JIC:
Organic Chenopodium Quinoa	N/A	N/A	N/A
Organic Alcohol	64-17-5	200-578-6	N/A

Suggested Use Levels:

Skin Care: 0.5% - 5%
Hair Care: 0.5% - 20%
Note: When formulating with Quinoa Protein as a replacement for Synthetic Fixative Resins in hair sprays, it is recommended for use in lower VOC (approx. 30% Alcohol) formulas.

pH: 4 -6

Packaging:

Vege Tech Organic Quinoa Protein is available in the following standard sizes:

- Sample size (2 fl. oz.)
- 8 lbs. (1 gal.)
- 40 lbs. (5 gal. pail)
- 240 lbs. (30 gal. drum)
- 400 lbs. (55 gal. drum)
- 2,200 lbs. (275 gal. tote)

Shelf Life: 1 year @ 25º C (77º F). Protect from freezing.