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Certificate of Analysis Sheet

Organic Amaranth Seed Oil

(*Amaranthus caudatus*)

| Description | |
|--------------------------|--|
| Latin name | Amaranthus caudatus |
| Description | Amaranth seed oil is the fixed oil expressed from the seeds of Amaranthus caudatus |
| INCI (EU) | AMARANTHUS CAUDATUS SEED OIL |
| Batch number: | 201025-1 |
| CAS Registry Number (EU) | 68956-68-3 ¹ |
| EC# (EINECS/ ELINCS) | 273-313-5 ¹ |
| CPNP reference | 3520948 |
| Customs tariff number | 1515 90 59 |

¹ Number of an expressed oil of vegetable origin consisting primarily of triglycerides of fatty acids (Vegetable oil / Olus oil).

| Physicochemical characteristics | | | |
|---------------------------------|--------------------------------------|--|--|
| Parameter | Method | Interval values | Range & unit |
| Density | 20 °C, DGF C-IV 2d, densimetry | 0,907 – 0,927 g/ml | 0,911 g/ml |
| Refractive index | DIN EN ISO 6320, Refractometry | 1,4720 – 1,4765 | 1,4743 |
| Acid value | DGF C-V 2, titration | ≤ 4,0 ¹ mg KOH/g (KOH = NaOH) | ≤ 4,0 ¹ mg KOH/g (KOH = NaOH) |
| Free fatty acids (FFA) | Calculated in oleic acid (DGF C-V 2) | ≤ 2,02 ¹ % | ≤ 2,02 ¹ % |
| Saponification value | EN ISO 3657, calculated | 170 – 220 mg KOH/g | 195 mg KOH/g (KOH = NaOH) |
| Iodine value | DGF-C-V 11d, Wijs | 78 – 102 g I ₂ /100g | 84 g I ₂ /100g Not drying |
| Peroxide value | § 64 LFGB L13.00-40, potentiometry | ≤ 10,0 ¹ meq O ₂ /kg oil | ≤ 10,0 ¹ meq O ₂ /kg oil |
| Solvent | - | - | None, free of alcohol (mechanical pressing) |

¹ The acid value, peroxide value and free fatty acids increase steadily during storage. However, the product will have under suitable storage conditions at the end of the best before date an acid value ≤ 4.0 mg KOH / g, a peroxide value ≤ 10.0 meq O₂ / kg oil and free fatty acids ≤ 2.02 %.

| Composition of the main fatty acids | | | | |
|-------------------------------------|-------------|---------------------|---------------------|------|
| According to DGF C-VI 10a, GC-FID | | | | |
| Name, molecular structure | Identifiers | Symbol ¹ | Interval values (%) | % * |
| Palmitic acid | Saturated | 16:0 | 14 – 25 | 18,3 |

| | | | | |
|---|------------------------------|------|---------|------|
| Stearic acid | Saturated | 18:0 | 2 – 7 | 4,5 |
| Oleic acid (9-Cis-Octadecenoic acid) | Omega-9, mono unsaturated | 18:1 | 23 – 38 | 30,3 |
| Linoleic acid (9-Cis,12-Cis-Octadecadienoic acid) | Omega-6, poly unsaturated | 18:2 | 32 – 49 | 41,8 |

¹ Number of carbon atoms and of double bonds.

| Further ingredients ¹ (Unsaponifiable fraction) | mg/kg (ppm) * |
|---|---------------|
| Squalene (triterpene) ² 6 – 8 % | 54.000 |
| Sterols | 24600 |
| Tocopherols | 653 |
| Tocotrienols | |
| Vitamin E, active | 283,2 |

¹ The oil is free of additives. The above Ingredients are naturally present in the oil.

² Amaranth seed oil has one of the highest levels of natural squalene among vegetable oils.

| Sterols ¹ LC-GC-FID | According to Leon- Camacho et al. (2001) (%) * | According to AOCS Firestone et al. (2013), page 14 (%) * |
|-----------------------------------|---|---|
| 24-methylen-cholesterol | 0,3 | - |
| Beta-sitosterol | 1,3 | - |
| Campesterol | 1,6 | - |
| Clerosterol | 42,0 | - |
| Delta-5-avenasterol | 2,0 | - |
| Delta-7-avenasterol | 11,9 | - |
| Delta-7-Ergosterol | - | 14 |
| Delta-7-campesterol | 24,8 | - |
| Delta-7-stigmastenol | 15,2 | - |
| Delta-7-stigmasterol | - | 16 |
| Spinasterol | - | 54 |
| Stigmasterol | 0.9 | 8 |

¹ In contrast to other vegetable oils, amaranth seed oil has a very high content of sterols. Most of the sterols in amaranth seed oil are esterified. This is a special particularity, because the percentage of free sterols is higher in almost all other vegetable fats. Another special particularity according to the results of Leon-Camacho et al. (2001) is the delta-7 structure of more than 50% of sterols; the other half is Clerosterol (42%).

| Vitamin E/ Tocopherols according to DGF F-II 4a | mg/kg (ppm) * |
|--|---------------|
| Vitamin E, active ¹ | 283,2 |
| Alpha-Tocopherol (α) | 133 |
| Beta-Tocopherol (β) | 268 |
| Gamma-Tocopherol (γ) | 57 |
| Delta-Tocopherol (δ) | 195 |

¹ Calculated from the tocopherols.

*The given values are to be considered as approximate average values, which are based on scientific references and/or analysis.