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#730

September 9, 2017

Dr. Paulette Gaynor
Office of Food Additive Safety (HFS-200)
Center for Food Safety and Applied Nutrition
Food and Drug Administration
5001 Campus Drive
College Park, MD 20740

Subject: GRAS Notice for Arachidonic Acid (ARA)-Rich Oil for Infant Formula Applications

Dear Dr. Gaynor:

On behalf of Linyi Youkang Biology Co., Ltd., we are submitting a GRAS notification for Arachidonic Acid (ARA)-Rich Oil for infant formula applications. The attached document contains the specific information that addresses the safe human food uses (infant formulas) for the notified substance. We believe that this determination and notification are in compliance with Pursuant to 21 C.F.R. Part 170, subpart E.

We enclose an original copy of this notification for your review. Please feel free to contact me if additional information or clarification is needed as you proceed with the review. We would appreciate your kind attention to this matter.

Sincerely,

(b) (6)

9/9/2017

Susan Cho, Ph.D.
Susanscho1@yahoo.com
Agent for Linyi Youkang Biology Co., Ltd.

enclosure

DETERMINATION OF THE GENERALLY RECOGNIZED AS SAFE (GRAS) STATUS OF ARACHIDONIC ACID-RICH OIL AS A FOOD INGREDIENT FOR INFANT FORMULA APPLICATIONS

Prepared for Linyi Youkang Biology Co., Ltd

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GENERALLY RECOGNIZED AS SAFE (GRAS) STATUS OF ARACHIDONIC ACID-RICH OIL INGREDIENTS AS FOOD INGREDIENTs FOR INFANT FORMULA APPLICATION

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PART 1. SIGNED STATEMENTS AND A CERTIFICATION

Pursuant to 21 CFR Part 170, subpart E, Shandong Linyi Youkang Biology, Ltd. (hereinafter referred to as 'Linyi Youkang Biology') submits a Generally Recognized as Safe (GRAS) notice and claims that the use of arachidonic acid (ARA)-rich oil (both oil and powder form) in foods, as described in Parts 2 through 7 of this GRAS notice, is not subject to premarket approval requirements of the FD&C Act based on its conclusion that the substance is GRAS under the conditions of its intended use.

1.A. Name and Address of the Notifier

Contact person: Guobin Li
Company name: Linyi Youkang Biology Co., Ltd (herein after referred to as 'Linyi Youkang Biology')
Address: Intersection of Lanbang Road, Economical and Technical Development Area, Linyi City, Shandong Province, China
Telephone number: +86-539-2650092
E-mail address: liguobin.aaa@163.com

1.B. Common or Trade Name

Arachidonic acid-rich oil, ARA, ARA-rich oil.

1.C. Applicable Conditions of Use of the Notified Substance

1.C.1. Foods in Which the Substance is to be Used

ARA-rich oil ingredients (both oil and powder forms) are intended to be used as nutritional ingredients in infant formula (ages from birth to 12 months).

1.C.2. Levels of Use in Such Foods

ARA-rich oil ingredients will be used as food ingredients in the same foods (i.e., infant formula) and at same levels to those specified in GRNs 326 (both term and pre-term infants), GRN 80 (term infants) and GRN 94 (pre-term infants). Maximum levels of 0.75% and 0.40% ARA by weight of fatty acids will be used in term and pre-term infant formulas, respectively, in combination with docosahexaenoic acid (DHA) at a ratio ranging from 1:1 to 2:1. These concentrations correspond to 1.875% for term infants and 1.00% of total fat for pre-term infants as ARA-rich oil since ARA concentration of ARA-rich oil is 40% by weight (bw). Corresponding maximum use levels of ARA-rich oil powder will be 7.5% and 4.0% for term and pre-term infants, respectively, as ARA-rich oil powder contains 10% ARA.

1.C.3. Purpose for Which the Substance is Used

The substances will be used as food ingredients for infant formulas.

1.C.4. Description of the Population Expected to Consume the Substance

The population expected to consume the substance consists of pre-term and full term infants.

1.D. Basis for the GRAS Determination:
This GRAS conclusion is based on scientific procedures in accordance with 21 CFR 170.30(a) and 170.30(b).

1.E. Availability of Information
The data and information that are the basis for this GRAS conclusion will be made available to FDA upon request by contacting Susan Cho at NutraSource, Inc. at the address above. The data and information will be made available to FDA in a form in accordance with that requested under 21 CFR 170.225(c)(7)(ii)(A) or 21 CFR 170.225(c)(7)(ii)(B).

1.F. Availability of FOIA Exemption
Privileged or confidential information such as trade secrets and/or commercial or financial information has been redacted from this document and the information contained in this dossier can be made publicly available if warranted. None of the data and information in Parts 2 through 7 of this GRAS notice are exempt from disclosure under the Freedom of Information Act, 5 U.S.C. §552.

1.G. Certification
Linyi Youkang Biology certifies that, to the best of our knowledge, that this GRAS conclusion is based on a complete, representative, and balanced dossier that includes all relevant information, available and obtainable by Linyi Youkang Biology, including any favorable or unfavorable information, and pertinent to the evaluation of the safety and GRAS status of the use of ARA-rich oil ingredients. Linyi Youkang Biology accepts responsibility for the GRAS determination that has been made for ARA-rich oil ingredients, as described in this dossier.

1.H Name, Position/Title of Responsible Person Who Signs Dossier and Signature

(b) (6)

_____ Date: September 8, 2017

Name: Guobin Li
Title: Chairman

Address correspondence to
Susan S. Cho, Ph.D., NutraSource, Inc.
Agent for Linyi Youkang Biology Co., Ltd.

1.I. FSIS/USDA Statement
Linyi Youkang Biology does not intend to add ARA-rich oil ingredients to any meat and/or poultry products that come under USDA jurisdiction. Therefore, 21 CFR 170.270 does not apply.

PART 2. IDENTITY, MANUFACTURING, SPECIFICATIONS, AND TECHNOCAL EFFECTS OF ARA-RICH OIL

2.A.1. Identity of the Notified Substance

2.A.1.1. Common or Trade Name: Arachidonic acid-rich oil, ARA, ARA-rich oil, or Arachidonic acid

2.A.1.2. Chemical Names
all-cis-5,8,11,14-eicosatetraenoic acid (20:4 n-6)

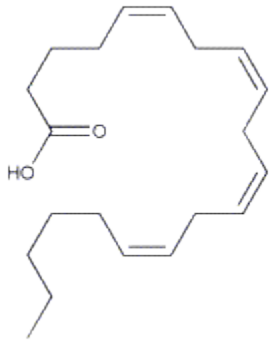
2.A.1.3. Chemical Abstract Service (CAS) Registry Number
506-32-1

2.A.1.4. Empirical Formula
Molecular formula of $C_{20}H_{32}0_2$

2.A.1.5. Molecular Weight
304.5

2.A.1.6. Structural Formula
Figure 1 shows the structure of ARA. In chemical structure, ARA is a carboxylic acid with a 20-carbon chain and four cis-double bonds; the first double bond is located at the sixth carbon from the omega end. Some chemistry sources define ARA to designate any of the eicosatetraenoic acids. However, almost all scientific literature limits the term to all-*cis*-5,8,11,14-eicosatetraenoic acid.

Figure 1. Chemical Structure of ARA.



2.A.1.7. Background

The ARA-rich oil contains approximately 40% ARA. Arachidonic acid is a polyunsaturated fatty acid (PUFA) present in the phospholipids (especially phosphatidylethanolamine, phosphotidylcholine, and phosphotidylinositides) in membranes of body cells, and is abundant in the brain, muscles, and liver. Arachidonic acid is a precursor of all prostaglandins, thromboxanes, and leukotrienes. Virtually all cellular ARA is esterified in membrane phospholipids where its presence is tightly regulated through multiple interconnected pathways. Arachidonic acid is not one of the essential fatty acids (FA). However, the infant may have a limited ability to convert essential precursor fatty acids linoleic acid (18:2n-6) to ARA and linolenic acid (18:3n-3) to DHA, due to reduced concentrations and activity of desaturase enzymes (Hadley et al., 2016; Martin et al., 2011). Arachidonic acid is one of the most abundant FAs in the brain, and is present in similar quantities to DHA. The two account for approximately 20% of its FA content. Like DHA, ARA is also involved in early neurological development. It also helps protect the brain from oxidative stress by activating peroxisome proliferator-activated receptor gamma. The supplementation of infant formula with ARA at levels consistent with those in human milk is important because the n-6 and n-3 fatty acids present in human milk have critical roles in membrane structure and as precursors of potent and highly reactive eicosanoids (Hadley et al., 2016). Although pre-term infants are capable of endogenous synthesis of ARA from precursor fatty acids, this capacity appears to be sub-optimal to meet the demands of the developing tissues. Thus, it is particularly important for pre-term infants to have supplemental ARA (FSANZ, 2003).

2.A.2. Potential Toxicants in the Source of the Notified Substance

Potential toxicants have not been identified. In general, no dioxins and furan, polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), pesticide residues (organochlorine and organophosphorus) and mycotoxins have been detected from Linyi Youkang Biology's ARA-rich oil products. The total amount of dioxins in ARA-rich oil derived was below 2 pg/g, the European Union (EU) maximum residual limit. All individual PAH components were below the limit of detection. There were no detectable levels of mycotoxins in ARA-rich oil: the levels of total aflatoxins and fumonisins were below 4 ppb and 60 ppb, respectively (Tables 2 to 9 and Appendix). The Certificates of Analysis are presented in Appendix.

Table 1. Organochlorine Pesticides Screened for ARA-Rich Oil Ingredients

Pesticide (detection limit, ppm)	Pesticide (detection limit, ppm)	Pesticide (detection limit, ppm)
Aclonifen (0.01)	Acrinathrin (0.02)	Aldrin (0.005)
Benfluralin (0.005)	Bifenox (0.02)	Binapacryl (0.02)
Bifenthrin (0.02)	Bromocyclen (0.02)	Bromoxynil-octanoate (0.01)
Butralin (0.02)	Chlordane, cis- (0.005)	Chlordane, oxy- (0.005)
Chlordane, trans- (0.005)	Chlorfenapyr (0.005)	Chlorfenprop-methyl (0.01)
Chlorfenson (0.01)	Chloroneb (0.05)	Chlorothalonil (0.01)
Chlorthal-dimethyl (0.005)	Cyfluthrin (0.02)	Cyhalothrin, lamda- (0.02)
Cypermethrin (0.02)	Cyphenothrin (0.02)	DDD, o,p- (0.005)

DDD, p,p'- (0.005)	DDE, o,p- (0.005)	DDE, p,p'- (0.005)
DDT, o,p'- (0.005)	DDT, p,p'- (0.005)	Deltamethrin (0.02)
Diallate (0.05)	Dichlobenil (0.01)	Dichlone (0.02)
Dicloran (0.005)	Dichlorobenzophenone, o,p- (0.4)	Dichlorobenzophenone, p,p- (0.04)
Dicofol, o,p- (0.04)	Dicofol, p,p- (0.04)	Dieldrin (0.005)
Dienochlor (0.02)	Dinitramine (0.01)	Dinobuton (0.02)
Endosulfan, alpha- (0.005)	Endosulfan sulphate (0.01)	Endosulfan, beta- (0.005)
Endrin (0.01)	Endrin ketone (0.01)	Esfenvalerate (0.02)
Ethalfluralin (0.01)	Etridiazole (0.01)	Fenfluthrin (0.02)
Fenpropathrin (0.02)	Fenson (0.01)	Fenvalerate (RR-/SS-Isomers)
Fenvalerate (RS-/SR-Isomers) (0.01)	Flubenzimine (0.01)	Fluchloralin (0.01)
Flucythrinate (0.02)	Flumetralin (0.01)	Fluorodifen (0.02)
Fluoroimide (0.02)	Genite (0.01)	Halfenprox (0.02)
HCH, alpha- (0.005)	HCH, beta- (0.01)	HCH, delta- (0.005)
HCH, epsilon- (0.005)	Lindane (gamma-HCH) (0.005)	Heptachlor (0.005)
Heptachlor epoxide, cis- (0.005)	Heptachlor epoxide, trans- (0.005)	Hexachlorobenzene (HCB) (0.005)
Ioxynil-octanoate (0.005)	Isobenzan (0.005)	Isodrin (0.005)
Isopropalin (0.01)	Methoxychlor (0.01)	Mirex (0.005)
Nitrapyrin (0.01)	Nitrofen (0.01)	Octachlorstyrene (0.01)
Oxyfluorfen (0.01)	Pendimethalin (0.01)	Pentachloranisole (0.01)
Pentachloroaniline (0.005)	Pentachlorothioanisolte (0.005)	Permethrin (0.02)
Plifenate (0.005)	Polychloroterpene (Camphechlor) (0.2)	Profluralin (0.005)
Propanil (0.02)	Quintozene (0.005)	S 421 (0.005)
Tau-Fluvalinate (0.02)	Tecnazene (0.005)	Tefluthrin (0.02)
Tetradifon (0.01)	Tetrasul (0.01)	Tralomethrin (0.02)
Triallate (0.02)	Trichloronat (0.01)	Trifluralin (0.005)

Table 2. Organophosphorus Pesticides Screened for ARA-Rich Oil Ingredients

Pesticide (detection limit, ppm)	Pesticide (detection limit, ppm)	Pesticide (detection limit, ppm)
Acephate (0.02)	Amidithion (0.02)	Azamethiophos (0.04)
Azinphos-ethyl (0.05)	Azinphos-methyl (0.05)	Carbophenothion (0.02)
Bromfenvinphos (0.02)	Bromophos-methyl (0.02)	Bromophos-ethyl (0.02)
Butamifos (0.02)	Cadusaphos (0.02)	Carbophenothion (0.02)
Carbophenothion-methyl (0.02)	Chlorfenvinphos (0.02)	Chlormephos (0.02)
Chlorpyrifos (-ethyl) (0.02)	Chlorpyrifos-methyl (0.02)	Chlorthion (0.02)

Chlorthiophos (0.02)	Coumaphos (0.05)	Crotoxyphos (0.02)
Crufomate (0.02)	Cyanofenphos (0.05)	Cyanophos (0.02)
Demeton-S-methyl (0.05)	Demeton-S-methyl-sulfone (0.05)	Dialifos (0.05)
Diazinon (0.02)	Dicapthon (0.01)	Dichlofenthion (0.02)
Dichlorvos (0.01)	Dicrotophos (0.02)	Dimefox (0.02)
Dimethoate (0.02)	Dimethoate/Omethoate (sum) ()	Dimethylvinphos (002)
Dioxabenzofos (0.02)	Dioxathion (0.02)	Disulfoton (0.02)
Disulfoton-sulfon (0.02)	Disulfoton-sulfoxide (0.04)	Ditalimfos (0.02)
Edifenphos (0.05)	EPN (0.05)	Ethion (0.01)
Ethoprophos (0.02)	Etrimfos (0.02)	Famophos (0.05)
Fenamiphos (0.02)	Fenamiphos (sum) ()	Fenamiphos-sulfone (0.02)
Fenamiphos-sulfoxide (0.02)	Fenchlorphos (0.02)	Fenchlorphos-oxon-sulfone (0.1)
Fenitrothion (0.01)	Fensulfothion (0.02)	Fensulfothion-oxon-sulfone (0.05)
Fensulfonthion-oxon-sulfoxide (0.02)	Fensulfothion-sulfone (0.02)	Fenthion (0.01)
Fenthion-oxon (0.02)	Fenthion-oxon-sulfone (0.05)	Fenthion-oxon-sulfoxide (0.02)
Fention-sulfone (0.05)	Fenthion-sulfoxide (0.02)	Fonofos (0.02)
Formothion (0.02)	Fosthiazate (0.02)	Fosthietan (0.02)
Heptenophos (0.02)	Iodofenphos (0.02)	Iprobenfos (0.02)
Isazophos (0.02)	Isocarbofos (0.02)	Isofenphos (0.02)
Isofenphos-methyl (0.02)	Isoxathion (0.05)	Leptophos (0.05)
Malaoxon (0.02)	Malathion (0.02)	Mecarbam (0.02)
Mephosfolan (0.02)	Merphos (0.02)	Methacriphos (0.02)
Methamidophos (0.02)	Methidathion (0.02)	Mevinphos (0.02)
Monocrotophos (0.01)	Morphothion (0.05)	Naled (0.02)
N-Desethyl-pirimiphos-methyl (0.02)	Omethoate (0.02)	Oxydemeton-methyl (0.05)
Paraoxon-ethyl (0.02)	Paraoxon-methyl (0.02)	Parathion (0.02)
Parathion-methyl (0.02)	Parathion-methyl/Paraoxon-methyl (sum) ()	Phenkapton (0.02)
Phenthoate (0.02)	Phorate (0.02)	Phorate (sum) ()
Phorate-sulfone (0.02)	Phorate-sulfoxide (0.02)	Phosalone (0.04)
Phosfolan (0.02)	Phosmet (0.05)	Phosphamidon (0.02)
Piperophos (0.02)	Pirimiphos-ethyl (0.02)	Pirimiphos-methyl (0.02)
Profenofos (0.02)	Propaphos (0.02)	Propetamphos (0.02)
Prothiofos (0.02)	Prothoate (0.02)	Pyraclofos (0.05)
Pyrazophos (0.05)	Pyridaphenthion (0.02)	Pyrimitate (0.02)
Quinalphos (0.02)	Quintiofos (0.02)	Sulfotep (0.02)
Sulprofos (0.05)	Tebupirimfos (0.02)	TEPP (0.02)
Terbufos (0.02)	Terbufos (sum) ()	Terbufos-sulfone (0.01)

Tetrachlorvinphos (0.02)	Thiometon (0.02)	Thionazin (0.02)
Tolclofos-methyl (0.02)	Triamiphos (0.05)	Triazophos (0.01)
Tribufos (0.04)	Trichlorfon (0.05)	Vamidothion (0.04)

Table 3. Mycotoxins Screened for ARA-Rich Oil Ingredients

Mycotoxin, ug/g	Lot: A2017030201	Lot: A2017031001	Lot: A2017031701
Fumonosine			
Fumonisin B1 (FB1)	< 20	< 20	< 20
Fumonisin B2 (FB2)	< 20	< 20	< 20
Fumonisin B3 (FB3)	< 20	< 20	< 20
Fumonisin sum (B1+B2)	< 40	< 40	< 40
Fumonisin sum (B1+B2+B3)	< 60	< 60	< 60
Aflatoxin			
Aflatoxin B1	< 1	< 1	< 1
Aflatoxin B2	< 1	< 1	< 1
Aflatoxin G1	< 1	< 1	< 1
Aflatoxin G2	< 1	< 1	< 1
Aflatoxin M1	<0.01	<0.01	<0.01
Sum of all positive Aflatoxins	< 4	< 4	< 4
Fusarium toxins			
Deoxynivalenol (Vomitoxin)	< 20	< 20	< 20
HT-2 Toxin	< 10	< 10	< 10
T-2 Toxin	< 10	< 10	< 10
Sum of T-2 and HT-2 toxin	< 20	< 20	< 20
Zearalenone (ZON)	< 10	< 10	< 10
Ochratoxin A (OTA)	< 2	< 2	< 2

Table 4. Dioxins and Furans Tested for the ARA-Rich Oil

Dioxins and Furans, pg/g	Lot: A2017030201	Lot: A2017031001	Lot: A2017031701
1,2,3,4,6,7,8-HeptaCDD	< 0.133	< 0.131	< 0.131
1,2,3,4,6,7,8-HeptaCDF	< 0.0933	< 0.0917	< 0.0918
1,2,3,4,7,8,9-HeptaCDF	< 0.0650	< 0.0638	< 0.0639
1,2,3,4,7,8-HexaCDD	< 0.0633	< 0.0622	< 0.0623
1,2,3,4,7,8-HexaCDF	< 0.0983	< 0.0966	< 0.0967
1,2,3,6,7,8-HexaCDD	< 0.0867	< 0.0851	< 0.0852
1,2,3,6,7,8-HexaCDF	< 0.0900	< 0.0884	< 0.0885
1,2,3,7,8,9-HexaCDD	< 0.0817	< 0.0802	< 0.0803
1,2,3,7,8,9-HexaCDF	< 0.0667	< 0.0655	< 0.0656
1,2,3,7,8-PentaCDD	< 0.0417	< 0.0409	< 0.0410
1,2,3,7,8-PentaCDF	< 0.0600	< 0.0589	< 0.0590
2,3,4,6,7,8-HexaCDF	< 0.0817	< 0.0802	< 0.0803

2,3,4,7,8-PentaCDF	< 0.0933	< 0.0917	< 0.0918
2,3,7,8-TetraCDD	< 0.0317	< 0.0311	< 0.0311
2,3,7,8-TetraCDF	< 0.0867	< 0.0851	< 0.0852
OctaCDD	< 0.967	< 0.949	< 0.951
OCtaCDF	< 0.200	< 0.196	< 0.197
WHO (2005)-PCDD/F TEQ (lower-bound)	Not Detected	Not Detected	Not Detected
WHO (2005)-PCDD/F TEQ (upper-bound)	0.172	0.169	0.169

Table 5. PCBs Tested for the ARA-Rich Oil

Polychlorinated Biphenyls	Lot: A2017030201	Lot: A2017031001	Lot: A2017031701
PCB 101, ng/g	< 0.167	< 0.164	< 0.164
PCB 105, pg/g	< 6.50	< 6.38	< 6.39
PCB 114, pg/g	< 0.883	< 0.867	< 0.869
PCB 118, pg/g	< 23.3	< 22.9	< 23.0
PCB 123, pg/g	< 0.667	< 0.655	< 0.656
PCB 126, pg/g	< 0.417	< 0.409	< 0.410
PCB 138, ng/g	< 0.167	< 0.164	< 0.164
PCB 153, ng/g	< 0.167	< 0.164	< 0.164
PCB 156, pg/g	< 3.67	< 3.60	< 3.61
PCB 157, pg/g	< 0.683	< 0.671	< 0.672
PCB 167, pg/g	< 1.83	< 1.80	< 1.80
PCB 169, pg/g	< 2.00	< 1.96	< 1.97
PCB 180, ng/g	< 0.167	< 0.164	< 0.164
PCB 189, pg/g	< 0.667	< 0.655	< 0.656
PCB 28, ng/g	< 0.167	< 0.164	< 0.164
PCB 52, ng/g	< 0.167	<0.164	< 0.164
PCB 77, pg/g	< 16.7	< 16.4	<16.4
PCB 81, pg/g	< 0.450	< 0.422	< 0.443
Total 6 ndl- PCB (lower-bound), ng/g	Not Detected	Not Detected	Not Detected
Total 6 ndl- PCB (upper-bound), ng/g	1.0	0.982	0.984
WHO (2005)-PCB TEQ (lower-bound), pg/g	Not Detected	Not Detected	Not Detected
WHO (2005)-PCB TEQ (upper-bound), pg/g	0.105	0.103	0.103

Table 6. TEQ Tested for the ARA-Rich Oil

TEQ-Totals WHO-PCDD/F and PCB	Lot: A2017030201	Lot: A2017031001	Lot: A2017031701
WHO (2005)-PCDD/F+PCB TEQ (lower-bound), pg/g	Not Detected	Not Detected	Not Detected
WHO (2005)-PCDD/F+PCB TEQ (upper-bound), pg/g	0.277	0.272	0.272

Table 7. PAHs Tested for the ARA-Rich Oil

Polynuclear Aromatic Hydrocarbons, ug/kg	Lot: A2017030201	Lot: A2017031001	Lot: A2017031701	Detection Limit
Acenaphthene	< 1.0	< 0.1	< 1.0	1
Acenaphthylene	< 2.0	< 2.0	< 2.0	2
Anthracene	< 2.0	< 2.0	< 2.0	2
Benzo(a)anthracene	< 0.50	< 0.50	< 0.50	0.5
Benzo (a)pyrene	< 0.50	< 0.50	< 0.50	0.5
Benzo-(b)-Fluoranthene	< 0.50	< 0.50	< 0.50	0.5
Benzo(ghi)perylene	< 2.0	< 2.0	< 2.0	2
Benzo(k)fluoranthene	< 3.0	< 3.0	< 3.0	3
Chrysene	< 0.50	< 0.5	< 0.50	0.5
Dibenzo(a,h)anthracene	< 3.0	< 3.0	< 3.0	3
Fluoranthene	< 1.0	< 1.0	< 1.0	1
Fluorene	< 2.0	< 2.0	< 2.0	2
Indeno(1,2,3-cd)pyrene	< 2.0	< 2.0	< 2.0	2
Naphthalene	< 20	< 20	< 20	20
Phenanthrene	< 2.0	< 2.0	2.5	2
Pyrene	< 1.0	< 1.0	< 1.0	1

Table 8. Residual Solvents Tested for the ARA-Rich Oil

Solvent Residues, mg/kg	Lot: A2017030201	Lot: A2017031001	Lot: A2017031701
1,1,1,2-Tetrachloroethane	< 0.01	< 0.01	< 0.01
1,1,1-Trichloroethane	< 0.01	< 0.01	< 0.01
1,1,2-Tricholorethane	< 0.01	< 0.01	< 0.01
1,1-Dichloroethane	< 0.05	< 0.05	< 0.05
1,2-Dichloroethane	< 0.05	< 0.05	< 0.05
2-Butanon (Methylethylketon)	< 1	< 1	< 1
2-Methylpentane	< 1	< 1	< 1
3-Methylpentane	< 1	< 1	< 1
Benzene	< 0.01	< 0.01	< 0.01
Bromodichloromethane	< 0.05	< 0.05	< 0.05
Chloroform (trichloromethane)	< 0.01	< 0.01	< 0.01
cis-Dichloroethane	< 0.05	< 0.05	< 0.05

Dibromochloromethane	< 0.05	< 0.05	< 0.05
Dichloromethane	< 0.05	< 0.05	< 0.05
Ethyl Acetate	< 1	< 1	< 1
Ethylbenzene	< 0.01	< 0.01	< 0.01
m-/-p-Xylene	< 0.01	< 0.01	< 0.01
Methylcyclopentane	< 1	< 1	< 1
n-Heptane	< 1	< 1	< 1
n-Hexane	< 1	< 1	< 1
n-Pentane	< 1	< 1	< 1
Styrene	< 0.01	< 0.01	< 0.01
Sum 3 chlorinated solvents	Inapplicable	Inapplicable	Inapplicable
Technical Hexane (calculated)	Inapplicable	Inapplicable	Inapplicable
Tetrachloroethane	< 0.01	< 0.01	< 0.01
Tetrachloromethane	< 0.01	< 0.01	< 0.01
Toluene	< 0.01	< 0.01	< 0.01
trans-Dichloroethene	< 0.05	< 0.05	< 0.05
Tribromomethane	< 0.05	< 0.05	< 0.05
Trichloroethene	< 0.01	< 0.01	< 0.01
Xylene (ortho-)	< 0.01	< 0.01	< 0.01

2.A.3. Particle Size
ARA oil-Not Applicable
ARA powder - NLT 95% passing a 60 mesh screen.

2.B. Method of Manufacture
Manufacturing process of the ARA-rich oil meets current Good Manufacturing Practice (cGMP) requirements for the production of food. All growth media, raw materials, and processing aids used in ARA fermentation and manufacturing processes meet internationally recognized specification requirements for food production. The fermentation process is well-controlled and critical control points are monitored to detect insufficient controls on the process (such as incomplete sterilization, incorrect pH or temperature ranges, insufficient fatty acid composition, etc). If any of those control characteristics fail to meet internal specifications, the fermentation is terminated and the batch rejected. Contamination checks also are conducted in the seed and production fermenter. The main fermentation reaction is stopped when the ARA content reaches the desired percentage above 40%. All finished batches of ARA-rich oil undergo rigorous quality assurance testing to meet well-defined product specifications prior to release. Arachidonic acid is derived from a fungal strain, *M. alpina* (Yuan et al., 2002) which was obtained from Shanghai Institute of Biochemistry, Academia Sinica.

The manufacturing processes employed by Linyi Youkang Biology to produce ARA-rich oil ingredients are as follows:

1. Seed cultures of *M. alpina* are scaled up sequentially in flasks followed by first and second stage fermenters; all accomplished under aerobic conditions.
2. Microorganisms from those seed cultures then are introduced into a nutrient-rich fermentation broth containing glucose and yeast powder.

3. The fermentation broth is grown under aerobic conditions in a series of progressively larger stirred-tank fermenters to eventually yield an ARA-rich biomass.
4. This biomass is filtered, dried, and extracted by hexane to yield crude ARA-rich oil.
5. Arachidonic acid-rich oil is then refined via a series of steps that include degumming, acid degumming, alkali refining, decolorization (activated clay and silicon dioxide) deodorization (steaming), and antioxidant addition.
6. Finished ARA-rich oil is packaged under vacuum in polyethylene that is approved for contact with fatty foods.
7. Excipients are added to ARA-rich oil and mixed. The mixture is spray dried to produce powder form of ARA-rich oil.

Extraction with hexane to produce a crude oil that is further refined, bleached, and deodorized using process operations is commonly employed in the vegetable oil industry. All equipments that have direct contact with finished ARA-rich oil or its intermediates are made of food-grade polyethylene, stainless steel, or carbon steel. The raw materials and processing aids used in the ARA-rich oil manufacturing process are summarized in Table 9 and 10, respectively. The ARA-rich oil ingredients are manufactured under cGMP to meet ISO 22000 standards for Hazard Analysis and Critical Control Point (HACCP) and food additive regulations established by the U.S. Food and Drug Administration (FDA).

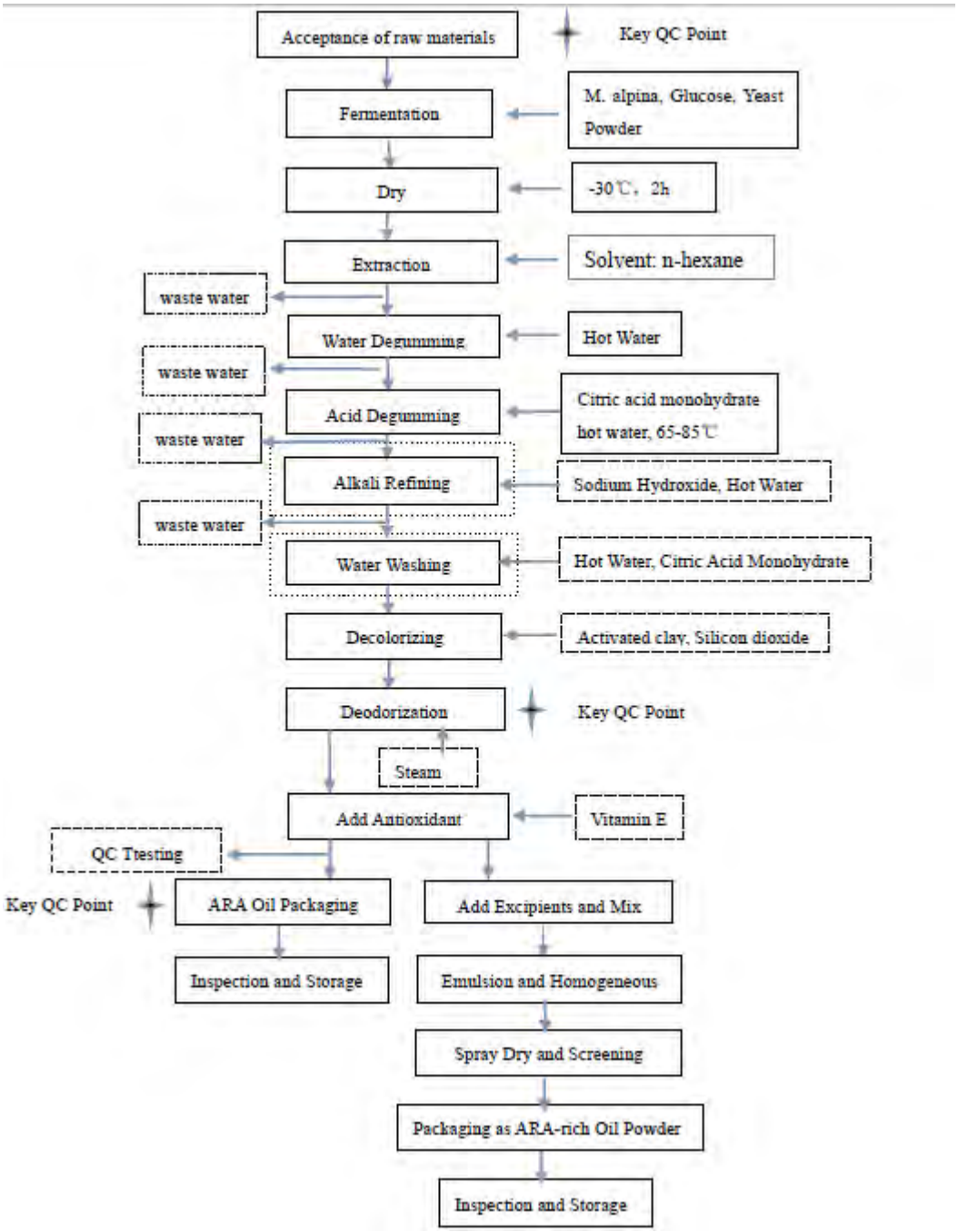
Table 9. Raw Materials Used in the Fermentation Process

Ingredient	CAS number	Regulatory status
Fermentation medium		
Yeast powder	8013-01-2	21CFR 184.1983
Glucose	50-99-7	21CFR 168.120

Table 10. Processing Aids

Item	CAS number	Regulatory status
Excipients for Powder Form		
Maltodextrin	9590-36-6	21CFR 184.1884
Sodium ascorbate	134-03-2	21CFR 182.3731
Processing aids		
Tocopherols	1406-66-2	21CFR 184.1890
Sodium hydroxide	1310-73-2	21CFR 184.1763
Citric acid monohydrate	5959-29-1	21CFR 184.1033
Activated clay (bentonite)	1302-78-9	21CFR 184.1155
Silicon dioxide	14808-60-7	21CFR 172.480
Hexane	110-54-3	21CFR 173.270

Figure 2. Manufacturing Flow Diagram of ARA-Rich Oil Ingredients



Characterization of the Source Organism

The principle of production method (via fungal production) is similar to those described by other companies whose production methods for ARA-rich oils have received no objection letters from the FDA (GRNs 41, 80, 94 and 326). *Mortierella alpina* is the most efficient production organism for ARA. It is a common soil fungus to which humans are frequently exposed (Streekstra, 1997). *M. alpina* is non-pathogenic and does not form potentially allergenic spores. The genus *Mortierella* is presently classified as a member of the family, Mortierellaceae, within the order of the Mucorales, class Zygomycetes (Table 11). The Mortierellaceae are ubiquitous saprophytic fungi that are easily and frequently isolated from soil. The pathogenic potential of the genus seems to be quite low. Within *Mortierella, M. wolfii,* a well-known pathogen of cattle, is the only currently recognized pathogen of the genus (Streekstra, 1997). Like many fungi, *M. alpina* is associated with common root crops and is, therefore, in the direct food chain of many mammals. Many human and animal studies demonstrated that ARA-rich oil from *M. alpina* is safe. This production strain was derived via ion implantation from a wild strain isolated from soil in the People's Republic of China. Ion implantation is a routine technique used for the isolation of production strains in the fermentation industry and *M. alpina* used for the production of ARA-rich oil is not considered a genetically modified organism.

Table 11. Taxonomic Classification of *M. alpina*

Class	Scientific Classification
Kingdom	Fungi
Phylum	Zygomycota
Subdivision	Mortierellomycotina
Class	Zygomycetes
Order	Mucorales
Family	Mortierellaceae
Genus	*Mortierella*
Species	*Mortierella alpina*

2.C. Specifications and Composition

ARA-rich oil is a free flowing, yellow oil, predominantly triglycerides (TG; >93%) with some diglycerides (4.4%), monoglycerides (~1.0%), and unsaponifiable material (<1.5%) as is typical for food-grade vegetable oils (Table 12).

Tables 13-1, 13-2, and 14 show specifications and three non-consecutive lot analytical results of ARA-rich oil and powder. For each ingredient, 3 non-consecutive lots were analyzed for ARA, total fatty acids, unsaponifiable matter, anisidine value, peroxide value, residual solvents, heavy metals, and microbiology to ensure that Linyi Youkang Biology's ARA-rich oil and powder ingredients met the specifications and were free from contaminants. Specifications for Linyi Youkang Biology's ARA-rich oil are similar to those described in the previous GRAS notices (GRNs 326, 94, 80 and 41): ARA concentrations are ≥40% (≥40% in GRN 326 and 94; 38-44%, in GRNs 80 and 41). Linyi Youkang Biology's specifications for acid value (0.5 vs. 1.0 mg KOH/g), unsaponifiable matter (1.5 vs. 3.0%), and anisidine value (10 vs. 20 AV) were lower

than those specified in GRN 326. The data indicate that Linyi Youkang Biology's ARA-rich oil is substantially equivalent to existing ARA-rich oils that have been the subjects of previous GRAS determinations (GRNs 326, 94, 80, and 41). Specifications for Linyi Youkang Biology's ARA-rich oil powder are similar to those described in the oil form although the ARA content is diluted by approximately 4 times. Total tocopherol contents of ARA-rich oil and oil powder are 97.0 and 24.2 mg/100 g, respectively (data are shown in Appendix, but not in summary tables).

Tables 15 to 17 present fatty acid profiles of ARA-rich oil ingredients. As shown in Table 16, the fatty acid profile of Linyi Youkang Biology's ARA-rich oil is similar to that described in previous GRAS notices, in particular those of GRNs 326 and 41. Fatty acid profile of ARA-rich oil powder is similar to that of ARA-rich oil, but is diluted by approximately 4 times (Table 17).

Table 12. Glyceride Profile of Linyi Youkang Biology's ARA-Rich Oil

Glyceride Profile, %	Lot: A2017030201	Lot: A2017031001	Lot: A2017031701	Mean
Triglycerides	93.28	93.29	93.77	93.45
Diglycerides	4.59	4.39	4.26	4.41
Monoglycerides	1.14	1.02	< 1.00	~1.05
Glycerol	< 1.00	< 1.00	< 1.00	<1.0

Table 13-1. Specifications of ARA-Rich Oil in Comparison with Those Specified in Previous GRAS Notices

Parameter	Current notice	GRN 326	GRN 94	GRNs 80 and 41
ARA, C 20:4n6, relative %	≥40	≥40	≥40	38-44*
Acid value, mg KOH/g	≤0.5	≤1.0	NA	NA
Free fatty acids		≤0.2	≤0.2	<0.4
Free fatty acids, % oleic acid	<0.1			
Unsaponifiable matter, %	≤1.5	≤3.0	<1.0	<3.5
Anisidine value	≤10	≤20	NA	NA
Peroxide value, meq/kg	≤2.5	≤2.0	<5.0	<5.0
Residual hexane, ppm	Not specified	≤1.0	NA	NA
Mercury (Hg), mg/kg	≤0.05	≤0.05	<0.5	<0.2
Lead (Pb), mg/kg	NA	NA	<0.1	<0.2
Arsenic (As), mg/kg	≤0.1		<0.2	<0.5
Cadmium (Cd), mg/kg	≤ 0.1		NA	NA
Moisture and volatile matter content, g/100 g	≤0.1	≤0.1	NA	NA
Coliforms, cfu/ml	≤1	≤3	NA	NA
Molds, cfu/ml	≤1	≤10	NA	NA
Yeast, cfu/ml	≤1	≤10	NA	NA
Salmonella, /25 g	Not Detected	NA	NA	NA

Aerobic plate count, cfu/ml	<100	NA	NA	NA

*Specifications for other fatty acids are included.

Table 13-2. Analytical Values for ARA-Rich Oil

Parameter	Analytical Value			Method of Analysis
	A2017030201	A2017031001	A2017031701	
ARA (C20:4n6), %	42.18	41.98	42.25	AOCS Ce 1b-89
Acid value, mg KOH/g	< 0.2	< 0.2	< 0.2	DGF C-V 2
FFA (Calc. as % oleic acid)	< 0.1	< 0.1	< 0.1	
Unsaponifiable matter, %	0.7	0.8	0.8	ISO 18609
Anisidine value (AV)	3.5	1.7	1.6	ISO 6885
Peroxide value, meq/kg	2.05	< 0.05	< 0.05	AOCS Cd 8b-90:2003
Residual hexane, ppm	< 1.0	< 1.0	< 1.0	Eurofin internal method, HS-GC-MS
Mercury (Hg), mg/kg	< 0.005	< 0.005	< 0.005	BS EN 13806:2002
Lead (Pb), mg/kg	< 0.05	< 0.05	< 0.05	BS EN ISO 17294-2 2004 mod.
Arsenic (As), mg/kg	< 0.1	< 0.1	< 0.1	BS EN ISO 17294-2 2004 mod.
Cadmium (Cd), mg/kg	< 0.01	< 0.01	< 0.01	BS EN ISO 17294-2 2004 mod.
Moisture and volatile matter content, g/100 g	0.03	0.04	0.03	ISO 662:1998
Ash, g/100 g	< 0.1	< 0.1	< 0.1	AOAC 941.12
Coliforms, cfu/ml	< 1	< 1	< 1	ISO 4832:2006
Molds, cfu/ml	< 1	< 1	< 1	ISO 21527:2008
Yeast, cfu/ml	< 1	< 1	< 1	ISO 21527:2008
Salmonella, /25 g	Not Detected	Not Detected	Not Detected	ISO 6579:2002
Aerobic plate count, cfu/ml	< 1	< 1	< 1	ISO 4833-1:2013

AOAC = Association of Official Analytical Chemists; AOCS = American Oil Chemist's Society; BS EN=British standards in English; cfu = colony forming units; ISO= International Organization for Standardization; meq = milliequivalents.

Table 14. Specifications and Analytical Values for ARA-Rich Oil Powder

Parameter	Specifications	COA			Method Analysis
		A2017 030201	A2017 031001	A2017 031701	
ARA, C 20:4n6, %	>10.00	10.8	10.9	10.8	AOCS Ce 1b-89
Acid value, mg KOH/g	<0.5	< 0.2	< 0.2	< 0.2	DGF C-V 2
Free fatty acids, % oleic acid	<0.1	<0.1	<0.1	<0.1	DGF C-V 2
Unsaponifiable matter, %	<1.0	0.7	0.8	0.8	ISO 18609
Anisidine value (AV)	≤ 10	3.5	1.7	1.6	ISO 6885
Peroxide value, meq/kg	<1.0	< 0.05	< 0.05	< 0.05	AOCS Cd 8b-90:2003
Residual hexane, ppm	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	
Mercury (Hg), mg/kg	<0.01	< 0.005	< 0.005	< 0.005	BS EN 13806:2002
Lead (Pb), mg/kg	< 0.1	< 0.05	< 0.05	< 0.05	BS EN ISO 17294-2 2004 mod.
Arsenic (As), mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	
Cadmium (Cd), mg/kg	< 0.1	< 0.01	< 0.01	< 0.01	
Moisture (direct drying method), %	<0.5	0.03	0.12	0.12	ISO 662:1998
Moisture and volatile matter content, %	<3.0	2.27	2.14	2.28	ISO 662:1998
Ash, %	<0.5	< 0.1	< 0.1	< 0.1	AOAC 941.12
Coliforms, cfu/ml	<10	<10	<10	<10	ISO 4832:2006
Molds, cfu/ml	<10	<10	<10	<10	ISO 21527:2008
Yeast, cfu/ml	<10	<10	<10	<10	ISO 21527:2008
Salmonella, /25 g	Not Detected	Not Detected	Not Detected	Not Detected	ISO 6579:2002
Aerobic plate count, cfu/ml	<10	< 10	< 10	< 10	ISO 4833-1:2013

AOAC = Association of Official Analytical Chemists; AOCS = American Oil Chemist's Society; BS EN=British standards in English; cfu = colony forming units; ISO= International Organization for Standardization; meq = milliequivalents.

Table 15. Fatty Acid Profiles of Linyi Youkang Biology's ARA-Rich Oil*

Fatty Acid Profile, g/100 g	Lot: A2017030201	Lot: A2017031001	Lot: A2017031701	Mean
C 6:0 (Caproic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 8:0 (Caprylic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 10:0 (Capric acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 12:0 (Lauric acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 14:0 (Myristic acid)	0.386	0.386	0.387	0.386

C 14:1 (Myristoleic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 15:0 (Pentadecanoic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 15:1 (Pentadecenoic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 16:0 (Palmitic acid)	7.257	7.236	7.274	7.256
C 16:1 (Palmitoleic acid)	0.121	0.120	0.122	0.121
C 17:0 (Margaric acid)	0.243	0.242	0.245	0.243
C 17:1 (Heptadecenoic acid)	0.098	0.067	0.068	0.078
C 18:0 (Stearic acid)	6.721	6.696	6.714	6.710
C 18:1 (Oleic acid)	5.916	5.891	5.924	5.910
C 18:1n7 (Vaccenic acid)	0.295	0.283	0.283	0.287
C 18:2n6 (Linoleic acid)	6.009	6.007	6.044	6.020
C 18:3n3 (alpha-Linolenic acid)	0.073	0.072	0.074	0.073
C 18:3n6 (gamma-Linolenic acid)	2.450	2.449	2.455	2.451
C 20:0 (Arachidic acid)	0.873	0.873	0.872	0.873
C 20:1 (Eicosenoic acid)	0.430	0.429	0.434	0.431
C 20:2n6 (Eicosodienoic acid)	0.421	0.417	0.418	0.419
C 20:3n3 (Eicosatrienoic acid)	0.229	0.229	0.229	0.229
C 20:3n6 (homo-gamma-Linolenic acid)	4.781	4.771	4.794	4.782
C 20:4n6 (Arachidonic acid)	43.914	43.780	44.067	43.920
C 20:5n3 (Eicosapentaenoic acid)	0.100	0.099	0.101	0.100
C 21:0 (Heneicosanoic acid)	0.063	0.067	0.067	0.066
C 22:0 (Behenic acid)	3.415	3.411	3.400	3.409
C 22:1n9 (Erucic acid)	0.114	0.114	0.114	0.114
C 22:2n6 (Docosadienoic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 22:6n3 (Docosahexaenoic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 22-5n3 (Docosapentaenoic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 22-5n6 (Docosapentaenoic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 23:0 (Tricosanoic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 24:0 (Lignoceric acid)	11.381	11.346	11.135	11.287
C 24:1 (Nervonic acid)	0.372	0.371	0.372	0.372
Monounsaturated fat	7.425	7.360	7.405	7.397
Omega-3 fatty acids	0.400	0.400	0.405	0.402
Omega-6 fatty acids	57.575	57.425	57.775	57.592
Polyunsaturated fat	57.975	57.820	58.180	57.992
Saturated fat	30.340	30.255	30.090	30.228
Total fat	95.75	95.44	95.68	95.623

*The analysis was done using AOAC method 996.06.

Table 16. Comparison of Fatty Acid Profiles of ARA-Rich Oils

Fatty Acid, g/100 g	Current notice	GRN 326	GRN 94	GRN 41
C 6:0 (Caproic acid)	< 0.02			
C 8:0 (Caprylic acid)	< 0.02	<0.01		
C 10:0 (Capric acid)	< 0.02	0.04		
C 12:0 (Lauric acid)	< 0.02	0.01		
C 14:0 (Myristic acid)	0.39	0.26	0.48	0.44
C 14:1 (Myristoleic acid)	< 0.02	0.01		
C 15:0 (Pentadecanoic acid)	< 0.02	0.09	0.17	
C 15:1 (Pentadecenoic acid)	< 0.02			
C 16:0 (Palmitic acid)	7.26	6.02	13.80	8.13
C 16:1 (Palmitoleic acid)	0.12	0.02	0.1	
C 17:0 (Margaric acid)	0.24	0.18	0.35	0.39
C 17:1 (Heptadecenoic acid)	0.08			
C 18:0 (Stearic acid)	6.71	5.27	7.75	9.04
C 18:1 (Oleic acid)	5.91	4.78	6.50	19.68
C 18:1n7 (Vaccenic acid)	0.29	0.22	0.40	0.28
C 18:2n6 (Linoleic acid)	6.020	7.87	10.90	6.78
C 18:3n3 (alpha-Linolenic acid)	0.07	0.04	0.57	
C 18:3n6 (gamma-Linolenic acid)	2.45	2.10	2.58	2.77
C 20:0 (Arachidic acid)	0.87	0.75	0.73	0.91
C 20:1 (Eicosenoic acid)	0.43	0.22	0.5	0.40
C 20:2n6 (Eicosodienoic acid)	0.42	0.44	0.63	0.63
C 20:3n3 (Eicosatrienoic acid)	0.23	0.03		
C 20:3n6 (homo-gamma-Linolenic acid)	4.78	3.69	3.27	1.96
C 20:4n6 (Arachidonic acid)	43.92	43.30	40.58	43.26
C 20:5n3 (Eicosapentaenoic acid)	0.10	0.14	0.20	~0.1
C 21:0 (Heneicosanoic acid)	0.067	0.10		
C 22:0 (Behenic acid)	3.41	3.11	2.45	2.00
C 22:1n9 (Erucic acid)	0.11	0.17	0.15	0.16
C 22:2n6 (Docosadienoic acid)	< 0.02	0.02		
C 22:6n3 (Docosahexaenoic acid)	< 0.02	0.04		
C 22-5n3 (Docosapentaenoic acid)	< 0.02	ND		
C 22-5n6 (Docosapentaenoic acid)	< 0.02	ND		<0.01
C 23:0 (Tricosanoic acid)0	< 0.02			
C 24:0 (Lignoceric acid)	11.29	10.12	6.40	1.93
C 24:1 (Nervonic acid)	0.37	0.51		0.17
C26:0		1.34		
Saturated fat	30.23	27.50	32.17	22.85
Total fat	95.62	95.06	99.86	98.69

Table 17. Fatty Acid Profile of Linyi Youkang Biology's ARA-Rich Oil Powder*

Fatty Acid Profile, g/100 g	Lot: 2017011001	Lot: 2017020701	Lot: 2017030101	Mean
C 6:0 (Caproic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 8:0 (Caprylic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 10:0 (Capric acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 12:0 (Lauric acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 14:0 (Myristic acid)	0.111	0.090	0.110	0.104
C 14:1 (Myristoleic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 15:0 (Pentadecanoic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 15:1 (Pentadecenoic acid)	< 0.020	< 0.020	< 0.020	< 0.020
C 16:0 (Palmitic acid)	1.778	1.631	1.775	1.728
C 16:1 (Palmitoleic acid)	0.035	0.035	0.033	0.035
C 17:0 (Margaric acid)	0.065	0.058	0.065	0.063
C 17:1 (Heptadecenoic acid)	< 0.020	< 0.020	< 0.020	<0.020
C 18:0 (Stearic acid)	1.542	1.469	1.539	1.517
C 18:1 (Oleic acid)	1.436	1.548	1.434	1.473
C 18:1n7 (Vaccenic acid)	0.064	0.069	0.064	0.066
C 18:2n6 (Linoleic acid)	1.681	2.519	1.674	1.958
C 18:3n3 (alpha-Linolenic acid)	< 0.020	< 0.020	< 0.020	0.02
C 18:3n6 (gamma-Linolenic acid)	0.622	0.550	0.621	0.598
C 20:0 (Arachidic acid)	0.207	0.192	0.206	0.202
C 20:1 (Eicosenoic acid)	0.084	0.065	0.084	0.078
C 20:2n6 (Eicosodienoic acid)	0.112	0.103	0.112	0.109
C 20:3n3 (Eicosatrienoic acid)	0.057	0.050	0.054	0.054
C 20:3n6 (homo-gamma-Linolenic acid)	1.106	1.016	1.105	1.106
C 20:4n6 (Aracihdonic acid)	11.314	11.372	11.282	11.323
C 20:5n3 (Eicosapentaenoic acid)	< 0.020	0.032	< 0.020	0.02
C 21:0 (Heneicosanoic acid)	< 0.020	< 0.020	< 0.020	0.02
C 22:0 (Behenic acid)	0.837	0.801	0.833	0.824
C 22:1n9 (Erucic acid)	< 0.020	< 0.020	< 0.020	0.02
C 22:2n6 (Docosadienoic acid)	< 0.020	< 0.020	< 0.020	0.02
C 22:6n3 (Docosahexaenoic acid)	< 0.020	< 0.020	< 0.020	0.02
C 22-5n3 (Docosapentaenoic acid)	< 0.020	< 0.020	< 0.020	0.02
C 22-5n6 (Docosapentaenoic acid)	< 0.020	< 0.020	< 0.020	0.02
C 23:0 (Tricosanoic acid)	< 0.020	< 0.020	< 0.020	0.02
C 24:0 (Lignoceric acid)	3.111	3.270	3.086	3.156
C 24:1 (Nervonic acid)	0.084	0.093	0.085	0.087
Monounsaturated fat	1.715	1.810	1.700	1.741
Omega-3 fatty acids	0.055	0.080	0.050	0.062
Omega-6 fatty acids	14.835	15.560	14.795	15.063
Polyunsaturated fat	14.890	15.645	14.850	15.128

Saturated fat	7.650	7.515	7.615	7.593
Total fat	24.31	25.00	24.22	24.51

*The analysis was done using AOAC method 996.06.

2.D. Stability

Based on commercial experience with similar oil derived from *M. alpina* (GRN 326 - FDA, 2010), a shelf life of 36 months is expected under frozen conditions.

2.E. Intended Technical Effects

ARA-rich oil ingredients can be used as a food ingredient in infant formula as a source of long-chain polyunsaturated fatty acids (PUFA) at concentrations consistent with cGMP.

PART III. DIETARY EXPOSURE

3.A. Estimated Dietary Intakes (EDIs) of ARA

The intended use of ARA-rich oil ingredients for addition to infant formula is to produce a product whose ARA concentration is consistent with that of human milk. The ARA content of human milk varies from 0.34% to 1.22% of total fatty acids among different populations. Therefore, the proposed use of 0.75% and 0.40% ARA by weight of fatty acids in term and preterm infant formulas, respectively, is within the range of ARA percentages found in human milk. The intended use of ARA-rich oil suggested in this GRAS notice is the same as concentrations mentioned in GRN 80 (term infants), GRN 94 (pre-term infants) and GRN 326 (term and pre-term infants). These concentrations correspond to 1.875% for term infants and 1.00% of total fat for pre-term infants as ARA-rich oil since ARA concentration of ARA-rich oil is 40% by weight. These concentrations also correspond to 7.50% for term infants and 4.00% of total fat for pre-term infants as ARA-rich oil powder since ARA-rich oil powder contains 10% ARA by weight. The ratios of ARA:DHA are expected to be in the range of 2:1 -1:1.

An estimate of exposure to ARA from its addition to infant formula is based on mean target ARA concentrations of 0.75% and 0.40% of total fat for term and pre-term infants, respectively. Assuming human infants consume about 100 kcal/kg bw/day (term infants) to 120 kcal/kg bw/day (pre-term infants), of which fat comprises about 50%, an infant will consume about 5.6 g (term infants) to 6.7 g (pre-term infants) of fat/kg bw/day (1 g fat = 9 kcal). These correspond to intakes of ARA of 42 mg and 27 mg ARA/ kg bw/day (corresponding to 104 and 67 mg of ARA-rich oil/kg bw/day or 420 and 270 mg ARA-rich oil powder/kg bw/day) for term infants and pre-term infants, respectively. This estimation method is the same as that used in GRN 326 (FDA, 2010).

3.B. Food Sources of ARA

Human milk provides small quantities of DHA and ARA, usually less than 1% of total fatty acids (Agostoni et al., 1999; Bahrami and Rahimi, 2005; Brenna et al., 2007; Young et al., 1997; Yuhas et al., 2006). Mean ARA content of American women's milk ranged from 0.40 to 0.67% of total FA (Brenna et al., 2007; Bopp et al., 2005; Jensen et al., 2005; Yuhas et al., 2006). Arachidonic acid content in colostrums tends to be higher (usually by 50%) than that of mature milk. Asian mothers tend to have higher ARA concentrations in their milk than their Western counterparts, and ARA concentrations ranged from 0.30 to 1.22% of total FA (Brenna et al., 2007).

3.C. EDIs of ARA from the Diet

It is not expected that infants would consume ARA from other foods while consuming infant formulas.

PART 4. SELF LIMITING LEVELS OF USE

No known self-limiting levels of use are associated with the ARA-rich oil ingredients. However, the ratios of ARA:DHA are expected to be in the range of 2:1 -1:1.

PART 5. HISTORY OF CONSUMPTION

EXPERIENCE BASED ON COMMON USE IN FOODS BEFORE 1958

The statutory basis for the conclusion of GRAS status of ARA-rich oil derived from *M. alpina* in this document is not based on common use in food before 1958. The GRAS determination is based on scientific procedures. ARA is present naturally in food. It is reasonable to conclude that it was present in food prior to 1958.

ARA-rich oils derived by fermentation of the fungus *M. alpina* have been used in commercially available infant formulas in at least 50 countries since the early 1990s.

PART 6. BASIS FOR GRAS DETERMINATION

6.A. Current Regulatory Status

Currently, ARA-rich oil has established a GRAS notice status with U.S. FDA. Table 3 summarizes the maximum ARA use concentrations in infant formulas approved for term and pre-term infants. The ARA concentrations for supplementation to infant formula ranged from 0.4 to 0.75% of total FA. Table 18 summarizes the recommendations specified in previous GRAS notices and those by various government agencies or health organizations.

Assumptions for the conversion between ARA intake and ARA level: (1) pre-term and term infants consume 120 kcal/kg bw/day and 100 kcal/kg bw/day, respectively, (2) fatty acids comprise 50% of the available energy in breast milk or infant formula, and (3) 1 g of fat contains 9 kcal.

Table 18. Maximum ARA Use Concentrations in Infant Formulas

	ARA source	Infants	% of total fat	Estimated intake (mg/kg bw/day)
GRN 041	*M. alpina*	Term	0.5	30
GRN 080	*M. alpina*	Term	0.75	45
GRN 094	*M. alpina*	Term	0.40	26.3
		Pre-term, hospitalized	0.40	32.4
		Pre-term, post-discharge	0.40	27.7
GRN 326	*M. alpina*	Pre-term	0.40	27
		Term	0.75	42
Present notice (same as GRNs 326, 094, and 080)	*M. alpina*	Pre-term	0.40	27
		Term	0.75	42

6.B. Review of Safety Data

As noted above, the FDA has issued ‘no question’ letters on four GRAS notices (GRNs 041, 080, 094, and 326) related to food uses of ARA-rich oils derived from *M. alpina* for infant formula applications. Based on a comparison of the specifications for these products, it is concluded that ARA in this GRAS determination is substantially equivalent to the other ARA-rich oils described in the FDA GRAS notices; thus, it is recognized that the information and data in the other GRAS notices are pertinent to the safety of the ARA-rich oil in this GRAS determination. Therefore, this notice incorporates by reference the safety and metabolism studies discussed in previous GRNs (GRN 326 - pages 61-153; GRN 94 - pages 78 - 318; GRN 80 - stamped pages 16-23 and 48-55; GRN 41 - stamped pages 108-118 and 175-418) and will not discuss previously reviewed references in detail. Additionally, this notice discusses additional animal and human studies that have been published since the FDA’s last review of 2010 (or in the period of January 2010 and July 2017). The subject of the present GRAS assessment is ARA-rich oil (both oil and powder forms).

6.B.1. Metabolic Fate of ARA

(adopted from Kremmyda et al., 2011; Kroes et al., 2003; Martin et al., 1993; 2011)

In breast milk, ARA and DHA are mainly found in the form of TG, although they also occur in phospholipids (Martin et al., 1993). Breast milk TG are primarily esterified at the sn-2 and sn-3 positions, with the sn-1 position being relatively deficient in these acids. Arachidonic acid accounts for approximately 0.77% of FAs (0.4% at the sn-2 position and 0.37% at the sn-3 position; DHA accounts for approximately 0.39% of FAs [0.26% at the sn-2 position and 0.13% at the sn-3 position]; Martin et al., 1993).

In general, dietary TGs undergo enzymatic hydrolysis in the upper intestine to free FAs and 2-monoglycerides. These products then are integrated into bile acid micelles for diffusion into the interior of the intestinal epithelial cells for subsequent incorporation into new or reconstituted TGs (Kroes et al., 2003). These reconstructed TGs enter the lymph in the form of chylomicrons for transport to the blood, which allows distribution and incorporation into plasma lipids, erythrocyte membranes, platelets, and adipose tissue. The chylomicron-contained TGs are hydrolyzed by lipoprotein lipase during passage through the capillaries of adipose tissue and the liver to release free FAs to the tissues for metabolism or for cellular uptake, with subsequent re-esterification into TGs and phospholipids for storage as energy or as structural components of cell membranes. The metabolism of FAs occurs in the mitochondria following their transport across the mitochondrial membrane in the form of acylcarnitine. Fatty acids are metabolized predominantly via beta-oxidation, a process that involves a shortening of the FA carbon chain and the production of acetic acid and acetyl CoA, which combines with oxaloacetic acid and enters the citric acid cycle for energy production. The degree of transport of FAs across the mitochondrial membrane is contingent upon the length of the carbon chain; FAs of 20 carbons or more are transported into the mitochondria to a lesser degree than shorter chain FAs. Therefore, long chain FAs, such as DHA, may not undergo mitochondrial beta-oxidation to the same extent (Kroes et al., 2003). Instead they are preferentially channeled into the phospholipid pool where they are rapidly incorporated into the cell membranes of the developing brain and retina.

Fatty acids can be desaturated endogenously up to the Δ9 position due to lack of certain enzymes in humans (Kremmyda et al., 2011). For this reason linoleic (18:2n-6) and linolenic (18:3n-3) acids must be obtained from the diet and are termed essential FA. Further elongation and desaturation of these FAs to produce long-chain polyunsaturated FA (PUFA) is possible, but not very efficient in humans. Examples of PUFA include ARA (20:4n-6), eicosapentaenoic (EPA; 20:5n-3), and DHA (22:6n-3). Thus, these FAs may be conditionally essential depending on essential FA availability.

In pre-term infants, approximately 80% of ingested ARA (either from breast milk or fungal ARA-supplemented formula) is absorbed. Non-absorbed ARA is excreted via the feces. In general, long chain PUFA concentrations increase from maternal tissues to fetal circulation to fetal tissues. Placenta FA composition can be indicative of maternal FA status and reflects FAs that are selectively transferred to the fetus. During the last trimester of pregnancy, the placenta provides the fetus with ARA and DHA. It is known that pre-term birth, which curtails maternal supply of ARA and DHA to the fetus, is associated with sub-optimal neural and visual

development, which can be improved by providing exogenous ARA and DHA (Kremmyda et al., 2011). After delivery, the premature infant becomes dependent on external sources for its nutritional requirements due to the shorter period and lesser extent of intrauterine long chain PUFA accumulation. In addition, the infant may have a limited ability to convert essential precursor fatty acids linoleic acid (18:2n-6) to ARA and linolenic acid (18:3n-3) to DHA, due to reduced concentrations and activity of desaturase enzymes (Martin et al., 2011). Supplementation of these precursor fatty acids may not provide normal concentrations of the downstream FA. Thus, pre-term infants should have higher postnatal long chain PUFA requirements than full-term infants although ARA supplementation can benefit both term and pre-term infants.

6.B. 2. Studies on Mutagenicity and Genotoxicity of ARA-Rich Oil (from *M. alpina*)

Studies published since FDA's review in 2010 (or from January 2010 to July 2017; Table 19)
In a study by Lewis et al. (2016), the safety of ARA-rich oil from *Mortierella alpina* was evaluated by testing for gene mutations and genotoxicity. The results of all genotoxicity tests were negative.

Bacterial Reverse Mutation Assays for ARA-Rich OiL
None of the revertant colonies exceeded three times the mean of the solvent control in the presence or absence of metabolic activation when treated with ARA-rich oil or DHA-rich oil. There was no dose-related increase over the range tested for any of the five tester strains used. The results indicate that ARA-rich oil is not mutagenic.

In Vitro Chromosomal Aberration Tests Using Human Blood Peripheral Lymphocyte with ARA-Rich Oil
In Phase I, the cultures were treated for 4 h with ARA- rich oil and the mean percent aberrant cells was determined in the presence and in the absence of metabolic activation for concentrations of 0.00 (water control), 0.00 (vehicle control), 1.25, 2.5, and 5.0 mg ARA-rich oil/mL and positive controls, respectively. For Phase II, test item treatment concentrations were 1.25, 2.5, and 5.0 mg ARA- rich oil/mL culture in the presence and in the absence of metabolic activation (2%). The duration of exposure was 24 h. The mean percentage of aberrant cells was determined in the absence and presence of metabolic activation. Treatment with 600 mg/mL ethyl methanesulfonate in the absence of metabolic activation, and 30 mg/mL cyclophosphamide in the presence of metabolic activation resulted in a significant increase in percent aberrant cells. The analysis did not reveal any statistically significant results for ARA-rich oil. Under these experimental conditions, ARA-rich oil did not induce chromosomal aberration and was not genotoxic both in the presence and in the absence of metabolic activation.

Mammalian Erythrocyte Micronucleus Tests for ARA-Rich Oil
Wistar rats treated with ARA-rich oil at all doses exhibited group mean frequency of polychromatic erythrocytes (PCE) to normochromatic erythrocytes and individual frequencies of micronucleated polychromatic erythrocytes that were similar to the values for the vehicle control group. The data suggested no evidence of genotoxicity.

Table 19. Summary of Studies Showing No Mutagenicity and Genotoxicty of ARA-Rich Oil

Test	Test system	Concentration/dose of ARA-rich or DHA-rich oils
Bacterial reverse mutation assay	S. typhimurium TA98, TA100, TA1535, TA1537, E. coli WP2 uvrA	0.1, 0.5, 1.25, 2.5, 3.75 and 5.0 mg/plate, plate incorporation and preincubation ± S9
In vitro chromosomal aberration test using human blood peripheral lymphocyte	Human blood peripheral lymphocytes	Phase I: Concentration of 0.0, 1.25, 2.5, and 5 mg Phase II: 1.25, 2.5, and 5.0 g mg/mL culture in presence and absence of metabolic activation (2%)
Mammalian erythrocyte micronucleus test	Polychromatic erythrocytes in bone marrow of treated rats	1000, 2500, and 5000 mg/kg bw/day

Adopted from Lewis et al. (2016)

The Studies Reviewed in GRN 326

Hempenius et al. (1997) reported that ARA-rich oil from *M. alpina* did not induce mutagenic or genotoxic activity (the Ames test in *Salmonella typhimurium* strains TA1535, TA1537, TA100, and TA102, as well as *E. coli* WP2uvrA, with and without S9 activation; up to 5,000 ug/plate showed no mutagenic activities of ARA-rich oil from *M. alpina*; Hempenius et al., 1997).

6.B.3. Animal Toxicity Studies of ARA-Rich Oil Derived from *M. alpina*

This review covers animal toxicity studies using ARA-rich oils derived from *M. alpina* (Table 20).

Acute Toxicity Study on Linyi Youkang Biology's ARA-Rich Oil

Gao (2017) evaluated acute toxicity of ARA-rich oil (42.1% ARA) in rats. ARA-rich oil was administered to 10 young rats (5 males and 5 females) by oral gavage at the dosage of 15.2 g/kg bw. Water control and vehicle control (sunflower oil) were included. Animals were observed for 14 days to monitor changes in body weight, clinical signs, as well as food consumption. At the end of the study, all surviving animals were sacrificed and major organs were examined. No animal died during the 14-day observation period and no clinical signs of abnormality were observed at the dose of 15.2 g/kg bw. Furthermore, no significant differences in mean body weight, food consumption, and organ weights were found among the test group and control groups (water control and sunflower oil vehicle control). No treatment-related abnormalities were observed in macroscopic examinations of organs. The author found that the mean lethal dose (LD_{50}) of ARA-rich oil was far above 15.2 g/kg bw.

Studies Published Between January 2010 and July 2017

In a study by Lewis et al. (2016), the safety of ARA-rich oil from *Mortierella alpina* was evaluated by conducting 28-day and 90-day dietary studies in Wistar rats. The 28-day and 90-day studies involved dietary exposure to 1,000, 2,500, and 5,000 mg/kg bw/day of the ARA-rich oils and two control diets: water and corn oil (vehicle control). There were no treatment-related effects of ARA-rich oil on clinical observations, body weight, food consumption, behavior, hematology, clinical chemistry, coagulation, urinalysis parameters, or necropsy findings. Increases in cholesterol and triglyceride (TG) levels were considered related to a high oil diet and non-adverse. In a series of toxicity studies (acute toxicity, 28 day subacute toxicity and 90 day subchronic toxicity), the no observable adverse effect level (NOAEL) for the ARA-rich oil from *M. alpina* was determined to be 5,000 mg/kg bw/day, the highest dose tested. The ARA-rich oil contained 40.3% ARA mostly in a form of TG (91%).

A study by Falk et al. (2017) investigated the reproductive and developmental toxicity of dietary exposure to ARA-rich oil (40.3% ARA) derived from *M. alpina.* In the developmental toxicity study, pregnant Wistar rats were untreated (control) or administered corn oil (vehicle control), 1,000, 2,500, or 5,000 mg/kg bw/day of ARA-rich oil via gavage from gestation days 6 through 20. In the reproductive toxicity study, male and female Wistar rats were administered vehicle control (corn oil), or 1,000, 2,500, or 5,000 mg/kg bw/day of ARA-rich oil via gavage throughout the mating period, pregnancy, and the nursing and lactation periods. Differences in the number of fetuses, fetal skeletal malformations, and external and visceral anomalies in the developmental study and mortality, clinical signs, fertility indices, physical observations, gross necropsy findings, and gestation period length in the reproductive toxicity study were not dose-related or significantly different from control groups, and were not considered to be treatment related. The NOAEL for maternal toxicity and embryo/fetal development and for paternal or maternal treatment-related reproductive toxicity for the ARA-rich oil administered by oral gavage was found to be 5,000 mg/kg bw/day in rats.

Gao et al. (2014) evaluated the potential toxicity of refined ARA-rich oil (48.3% ARA) derived from *M. alpina* by performing a 90-day subchronic study in F1 Sprague Dawley (SD) rats with *in utero* exposure. This study was preceded by a 4-week pretreatment period of parental (F0) rats and exposure of the F0 dams throughout mating, gestation, and lactation. The results indicated that ARA-rich oil, at concentrations of 0.5%, 1.5%, and 5.0% of diet, did not affect either reproductive performance of the parental rats, or any characteristics of the pups. In the subchronic study with the offspring (F1) rats, no treatment related abnormalities were observed. Thus, the NOAEL was placed at 5% ARA-rich oil, the highest level tested. This level corresponds to approximately 3,750 mg/kg in F0 females, 2,850 mg/kg in F0 males, 4,850 mg/kg in F1 females, and 4,480 mg/kg in F1 males.

Tyburczy et al. (2012) evaluated the effect of physiologically high dietary ARA-rich oil derived from *M. alpina* on growth, clinical chemistry, hematology, and immune function in newborn piglets. Three-day old piglets were administered one of seven diets for 25 days: 6 diets with varying ratios of ARA:DHA as follows (g/100 g FA/FA): 0.1/1.0; 0.53/1.0; 0.69/1.0; 1.1/1.0; 0.67/0.62; and 0.66/0.33. A seventh group was maternal-reared and remained with the dam during the study. No treatment-related abnormalities were observed in formula intake, growth, clinical chemistry, hematology, or immune status measurements. The authors concluded that a

dietary ARA concentration up to 1% total FA (or 49 mg/100 kcal of the formula) was safe and had no adverse effect on any of the safety outcomes measured.

The 2011 study of Tyburczy et al. compared the bioequivalency of three different sources of ARA-rich oils when the formula contained 0.64% ARA derived from *M. alpina* and 0.32% DHA (from *C. cohnii*) of total lipids. It was hypothesized that the three ARA-rich oils would be nutritionally bioequivalent and equally safe in rapidly-growing neonatal pigs. Piglets were fed one of three ready-to-use formulas that provided ARA at approximately 0.64% and DHA at 0.34% total FA from day 3 to 22 of life, upon which tissues were harvested and analyzed for ARA and DHA accretion. All 3 ARA-rich oils were manufactured using *M. alpina* by 3 different companies. Bioequivalence was assessed by 90% confidence intervals on the least squares geometric mean ratio of tissue ARA from the experimental groups compared with the Control. Bioequivalence was met if the confidence intervals, expressed as percentages with 100% equaling unity (i.e. 1:1 ratio), fell within the limits of 80 – 125%. For both experimental diets, the 90% confidence intervals fell within the 80 – 125% limits for every tissue (including liver histology) as well as clinical chemistry and hematological parameters examined, establishing that two sources of ARA-rich oils (Cargill's RAO and Nippon Suisan Kaisha, Ltd.'s SUNTGA40S) were bioequivalent sources of ARA for tissue and RBC ARA accretion compared with reference ARA-rich oil, ARASCO (Martek/DSM).

Studies Reviewed in GRN 326

The LD_{50} was found to be 18.2 g for ARA-rich oil or 6.2 g for ARA (Hempenius et al., 1997). Subchronic toxicity study in rats reported the following NOAEL values: 3.0% in diet for *M. alpina* biomass in the first generation (F0) rats (Nisha et al., 2009) and 970 mg ARA-rich oil/kg bw/day or 374 mg ARA/kg bw/day in the second generation (F1) rats after *in utero* exposure (Hempenius et al., 2000). Shorter-term studies also reported the NOAEL value of up to 3,000 mg ARA-rich oil/kg bw/day or 1,000 mg ARA/kg bw in F0 rats (Hempenius et al., 1997; Merritt et al., 2003). A blend of ARA-oil from *M. alpina* and DHA-oil from *C. cohnii* was found to be safe up to 12% of the diet (Burns et al., 1999; Wibert et al., 1997).

Conclusion:

Based on the above listed studies, for purposes of safety evaluation, a NOAEL of 5,000 mg/kg bw/day was chosen for ARA-rich oil and 2,000 mg/kg bw/day for ARA in rats. The NOAEL of 2,000 mg ARA/kg bw/day may represent approximately 74 times the infant intake of ARA in human milk.

Table 20. Summary of Animal Toxicity Studies of ARA-Rich Oils Derived from *M. alpina*

Species	Test substance	Dose	Duration	NOAEL	Reference
Linyi Youkang Biology's ARA-Rich Oil					
Rat	ARA-rich oil from *M. alpina* (ARA 42.1% of total FA)	0 or 15.2 g/kg bw	Single dose	LD50>>>15,200 mg/kg bw	Gao et al., 2017
Studies Published since FDA's Review in 2010					
Rat, Wistar	ARA-rich oil from *M. alpina* (40.3% ARA)	0, 1,000, 2,500, 5,000 mg/kg	13 wk	ARA-rich oil-5,000 mg/kg bw/day	Lewis et al., 2016
Rat, Wistar	ARA-rich oil from *M. alpina* (40.3% ARA)	0, 1,000, 2,500, 5,000 mg/kg	Gestation days 6-20-developmental toxicity	ARA-rich oil-5,000 mg/kg bw/day	Falk et al., 2017
Rat, Wistar	ARA-rich oil from *M. alpina* (48.3% ARA)	0, 1, 1.5, or 5% of diet	13-wk of F1, after in utero exposure of F0	ARA-rich oil-5,000 mg/kg bw/day	Gao et al., 2014
Piglet	ARA-rich oil from *M. alpina*	0.1-1.0% ARA of total FA	19-25 days	1.0% ARA of total FA	Tyburczy et al., 2012
Studies Reviewed in GRN 326					
Rat, Wistar	ARA-rich oil (ARA ~34% of total FA)	18.2 g ARA-rich oil /kg bw or 6.2 g ARA/ kg bw	Single dose; observed 14 days	LD_{50}=18.2 g ARA-rich oil/kg bw or 6.2 g ARA/ kg bw	Hempenius et al., 1997
Rat, Wistar	ARA-rich *M. alpina* biomass	Up to 5 g/kg bw	Single dose; observed 14 days	LD_{50}>5 g biomass/kg bw or >0.63 g ARA/kg bw	Nisha et al., 2009
Piglet	ARA-rich oil (40% ARA)	62 or 96 mg ARA/100 kcal	16 days	96 mg ARA/100 kcal or 154 mg ARA/kg bw/day	Merritt et al., 2003
Rat, Wistar	ARA-rich oil (34% ARA)	100, 600, 2,000, or 3,000 mg ARA-rich oil	4 wk	3,000 mg ARA-rich oil/kg bw/day or 1,000 mg ARA/kg bw	Hempenius et al., 1997
Rat, Wistar	ARA-rich *M. alpina* biomass (13.1% ARA)	0, 0.25, 0.5, 1.0, 2.0 and 3.0% of diet	13 wk	3.0% *M. alpina* biomass in diet	Nisha et al., 2009

Rat, Wistar	ARA-rich oil, (38.6% ARA)	3,000, 15,000, or 75,000 ppm	13-wk of F1, after in utero exposure of F0	15,000 ppm in diet, 970 mg ARA-rich oil/kg bw/day, or 374 mg ARA/kg bw/day	Hempenius et al., 2000
Blend of ARA-oil from *M. alpina* and algal DHA-oil					
Rat, SD	Blend of ARA-oil from *M. alpina* +DHA-oil from *C. cohnii*	1.8, 6, or 12% of the diet	4 wk	12% of the oil blend in the diet	Wibert et al., 1997
Rat, SD	Blend of ARA-oil from *M. alpina* +DHA-oil from *C. cohnii*	1.8, 6, or 12% of the diet	13 wk after *in utero* exposure	12% of the oil blend in the diet	Burns et al., 1999

6.B.4. Human Clinical Studies of ARA-Rich Oils

Our review has focused on the papers that have been published since FDA's last review of 2010 or the papers published between January 2010 and July 2017.

Pre-term infants

The studies published since 2010 reported no adverse effects of ARA-rich oils of unknown sources in pre-term infants (Table 21; Almaas et al., 2015, 2016; Alshweki et al., 2015; Kitamura et al., 2016; van de Lagemaat et al., 2011; Westerberg et al., 2011). These studies reported that ARA supplementation was safe up to 0.91% total FAs. Measurements included adverse effects and safety, growth and anthropometric parameters (Kitamura et al., 2016).

GRN 326 included the studies on ARA derived from *M. alpina* which found no adverse effects of ARA in preterm infants (Table 22; Carnelli et al., 2007; Clandinin et al., 2005; Groh-Wargo et al., 2005). These studies found that ARA supplementation was safe up to 0.84% total FAs.

Regardless of sources, no studies found adverse effects of ARA supplementation (up to 0.91% total fatty acids) in pre-term infants (Tables 21 and 22).

Term infants

Due to the abundance of literature demonstrating the safety of ARA or ARA-rich oil derived from *M. alpina* for full term infant formula applications, our review of term infant studies is limited to the papers on ARA derived from *M. alpina* only. A few papers published since the FDA's last review in 2010 demonstrated the safety of ARA-rich oils derived from *M. alpina* (Tables 23 and 24). Studies show that supplementation of ARA-rich oils did not show any adverse effects at doses up to 0.64% total FAs as ARA (Birch et al., 2010; Colombo et al., 2011; De Jong et al., 2010, 2011, 2012; Drover et al., 2011, 2012).

In GRN 326, term infant studies demonstrated the safety of ARA-rich oils derived from *M. alpina* at up to 0.72% of total FAs (Birch et al., 2005, 2007; Drover et al., 2009; Fields et al., 2008; Hoffman et al., 2008).

Overall, the studies using 0.64-0.72% of total FAs as ARA (0.72% - Birch et al., 2005, 2007; 0.64% - Birch et al., 2010; Colombo et al., 2011; Drover et al., 2011, 2012) demonstrated the safety of ARA-rich oil derived from *M. alpina* in term infants. Measurements included adverse effects and safety (Birch et al., 2005, 2010; Hoffman et al., 2008), growth and anthropometric parameters, incidence of upper respiratory infections, and common allergic diseases (Birch et al., 2010); mental development index scores and visual acuity (Drover et al., 2009, 2011, 2012); behavioral and psychophysiological indices of attention and cognitive development (Colombo et al., 2011, 2013; De Jong et al., 2010, 2011, 2012), and/or cardiovascular and growth (De Jong et al., 2010, 2011, 2012). No studies reported adverse effects of ARA or ARA-rich oil.

Table 21. Pre-term Infants Studies Published since 2010

Objective	Subject	Test materials	Duration	Measurements	Reference
To investigate the safety and efficacy of an infant formula fortified with DHA and ARA	35 low or very low birth weight infants with bw of >1000 g	Two groups: 1) 4.6 mg ARA +9.1 mg DHA/100 mL (test); 2) 1 mg ARA+9.1 mg DHA/100 mL (control) source-Morinaga	Intervention started at bw of >2,000 g or higher (after discharge ICU)	Adverse events and safety; growth; ARA and DHA contents of the erythrocyte membrane	Kitamura et al., 2016
To determine the effects of a balanced contribution of arachidonic acid in very preterm newborns fed with formula milk	60 newborns <1500 g and/or <32 wk gestational age	Three groups: 1) formula containing 0.66% ARA (0.62-0.72%) and 0.33% (0.31-0.36%) DHA; 2) formula with 0.30-0.37% ARA and 0.30-0.37% DHA; or 3) breast milk source-NA	14 mo; 24 mo follow-up	Risk factors (APGAR score, use of surfactant, sepsis, need for mechanical ventilation, use of FiO2 > 30 %, presence of intracranial hemorrhage, administration of ibuprofen for patent ductus arteriosus, and presence of bronchopulmonary dysplasia); psychomotor development; anthropometric assessment; risk and plasma levels of fatty acids	Alshweki et al., 2015
To test the hypothesis that DHA/ARA supplementation of very low birth weight (VLBW) infants would influence cerebral white matter measured by	129 VLBW infants with birth weights of <1500 g	Human milk supplemented with 31 mg ARA (0.91% of total FAs) and 32 mg DHA (0.86% of total FAs); source-NA	9 wk after birth; 8 yr follow-up	White matter measured by diffusion tensor imaging of brain; and behavioral outcome	Almaas et al., 2016

diffusion tensor imaging and improve behavioral outcome at 8 years of age.					
To test the hypothesis that DHA/ARA supplementation of VLBW infants fed human milk would show persistent positive effects on cognition	129 VLBW infants with birth weights of <1500 g	Human milk supplemented with 31 mg ARA (0.91% of total FAs) and 32 mg DHA (0.86% of total FAs); source-NA	9 wk after birth; 8 yr follow-up	Cognitive testing, general intellectual abilities, short-term and working memory, learning and memory, MRI analysis;	Almaas et al., 2015
To study associations between growth and RBC concentrations of ARA and DHA	139 pre-terms (51% male, mean gestational age 30.3 wk, mean birth weight 1341 g)	Human milk with breast milk fortifier or pre-term formula until term, followed by post-discharge formula (0.4% ARA, 0.4% DHA), term formula (0.2% ARA, 0.2% DHA), or human milk. Source-NA	6 mo	Growth (weight gain, length, and head circumference); RBC concentrations of ARA, DHA, and EPA; and	van de Lagemaat et al., 2011
To investigate the effect of ARA and DHA in early neonatal life on cognitive functions among human milk fed very low birth weight infants (<1500 g) at 20 mo of chronological age.	92 VLBW infants	Human milk with 0.5 mL oil (containing 31 mg ARA plus 32 mg DHA or placebo) per 100 mL milk; source-NA	1 wk after birth until discharge from hospital; 9 wk on average; follow up at 20 mo	Cognitive function tests were performed at 20 months (Free-play sessions, Bayley Scales of Infant Development - the Ages and Stages Questionnaire); and plasma DHA and ARA concentrations	Westerberg et al., 2011

DHA and ARA= Percentages in diet given as % of total FAs unless noted otherwise. EPA = eicosapentaenoic acid; ICU = intensive care unit; *M. alpina* = *Mortirella alpina*; NA = not available; RBC = red blood cell; VLBW = very low birth weight.

Table 22. Pre-term Infants Studies Included in GRN 329

Objective	Subjects	Test Material and Dose	Duration	Measurements	Reference
Studies with ARA-oil derived from *M. alpina*					
To evaluate growth and body composition of pre-mature infants who were fed formulas with ARA and DHA to 1 y of gestation-corrected age	60 pre-term infants (birth wt 750-1,800 g and gestational age at birth <33 wk)	3 groups until 40 wk corrected age:1) formula with 0.42% ARA (egg-derived TG and 0.26% DHA (fish oil); 2) 0.42% ARA (fungal oil) and 0.26% DHA (fish oil) or 3) control, unsupplemented; At 40 wk, -0.42% ARA and 0.16% DHA from same sources or control	Up to 52-wk gestational corrected age of infants	Growth, lean body mass, and bone mineralization (bone mineral content and bone mineral density)	Groh-Wargo et al., 2005
To evaluate safety and benefits of feeding pre-term infants formulas containing DHA and ARA until 92 wk postmenstrual age (PMA), with follow-up to 118 weeks PMA	361 pre-term infants <35 wk PMA randomized over the control and test groups	4 groups: 1) Formula plus 34 mg ARA (*M. alpina*) + 17 mg algal DHA (/100 kcal; 2) Formula plus 34 mg ARA(funga1) + 17 mg DHA (fish oil)/100 kcal; Concentrations of ARA (0.6%) and DHA (0.3%) of total fatty acids chosen to be similar to concentrations in human milk. 3)-4) two controls-unsupplemented formula and human breast milk	A prospective, RCT; 92 wk PMA with follow-up in second phase at 118 wk PMA	Growth, tolerance, adverse events, morbidity, and Bayley development scores	Clandinin et al., 2005
To quantify the synthesis of long chain PUFA in pre-term	22 pre-term infants	Fungal ARA (0.84%) 12.0 mg + DHA (fish oil), 7.1 mg per 100 mL of formula; or control –	From birth to 7 mo	Absolute long chain PUFA synthesis and the percentage of	Carnielli et al., 2007

infants fed infant formula containing long chain PUFA		non-supplemented formula		long chain PUFA synthesis relative to dietary intake; and plasma phospholipids	

DHA and ARA= percentages in diet given as % of total FA unless noted otherwise. PMA = postmenstrual age; *M. alpina = Mortirella alpina;* PUFA = polyunsaturated fatty acids; RCT = randomized controlled trial.

Table 23. Term Infant Studies Published Since 2010

Objective	Subject	Test materials	Duration	Measurements	Reference
To evaluate cognition beyond 18 mo and longitudinal cognitive change from 18 mo to 6 y in children who were fed variable amounts of DHA and a fixed concentration of ARA (0.64%) compared with children who were not fed ARA/DHA as infants.	81 full term infants	ARA, 0.64% (34 mg/100 kcal, from *M. alpina*) for all 3 DHA concentrations; DHA (from *C. cohnii* oil), DHA: 0.32% (Enfamil LIPILW), 0.64%, or 0.96%. Control-unsupplemented	Formula fed for 12 mo; re-enrolled at 18 mo and tested every 6 mo until 6 yr	Performance on standardized tests of language and performance (Bayley Scales of Infant Development, version 2 and MacArthur-Bates Communicative Development Inventory; Delayed Response task; Bear-Dragon Go/No-Go Task; Stroop tasks; Dimensional Change Card Sort; Tower of Hanoi task; Peabody Picture Vocabulary Test, 3rd edition; The Weschler Preschool Primary Intelligence Scale, 3rd edition	Colombo et al., 2013
To determine the optimal DHA concentration with fixed ARA conc. in term formula to support cognitive maturation.	181 term infants		First 12 mo of life, sole source of nutrition until < 4 mo of age; Follow up at 18 mo	Cognitive development as measured by Bayley Scales of Infant Development II (including the Psychomotor Development Index and the Behavior Rating Scale	Drover et al., 2011
To determine the effects of ARA/DHA provided during the first 12 mo of life on language development and school readiness	182 term infants at 1-9 days of age		Prospective, RCT; 12 m intervention; follow up until age 2-3.5 yr	School readiness at age 2.5 and 3.5 yr; receptive vocabulary at age 2 and 3.5 yr	Drover et al., 2012
To determine the	122 term		RCT; from	A cognitive index derived from the	Colombo et al.,

effects of ARA/DHA on visual habituation protocol that yielded both behavioral and psycho-physiological indices of attention at 3, 6, and 9 mo	infants		birth to 12 mo RCT	convergence of behavioral and cardiac responses; a visual habituation protocol that yielded both behavioral and psychophysiological indices of attention	2011
To determine the effect of ARA/DHA supplementation on the visual acuity of formula-fed infants	343 healthy term infants		First 12 mo of life (from days 1-9), sole source of nutrition until < 4 mo of age	Physical growth (weight, length, weight/length ratio, and head circumference); visual acuity maturation, RBC fatty acids, tolerance, anthropometric measures, and adverse events	Birch et al., 2010
To investigate whether 2 mo long chain PUFA formula supplementation affects cardiovascular and anthropometric development at 9 yr	Intervention until 2 mo of age; all formula-fed infants had control formula from 2 mo to 6 mo; follow-up at 18 mo and 9 yr	Test-0.45% ARA (from egg yolk & *M. alpina*) + 0.30% DHA (from egg/tuna oil) (n=145); or 2 controls-unsupplemented formula and breast-fed	473-475 term infants	Cardiovascular and anthropometric development, neurological function and cognition at up to 9 yr; measured blood pressure, heart rate, growth, and cognition	De Jong et al., 2010, 2011, 2012

DHA and ARA= percentages in diet given as % of total FA unless noted otherwise. *M. alpina = Mortirella alpina;* PUFA = polyunsaturated fatty acids; RCT = randomized controlled trial.

Table 24. Term Infants Studies Included in GRN 329

Objective	Test material and concentration in infant formula	Type and duration of the study	Subjects	Measurements	Reference
ARA-Rich Oils Derived from *M. alpina*					
To evaluate DHA and ARA-supplementation of infant formula on visual and cognitive outcomes at 4 yr of age	4 groups: 2 Tests- test 1) 0.72% ARA + 0.36% DHA (algal; n=17); test 2) only with 0.36% DHA (n=16); and 2 controls- unsupplemented formula (n=19) and human milk (n=32). Source: *M. alpina*	Prospective, RCT. Intervention from birth to 2 mo of age; follow up at age of 4 yr	119 healthy term infants	Cognition and visual acuity (HOTV visual acuity, Wechsler preschool and primary scale of intelligence)	Birch et al., 2007
To evaluate ARA/DHA supplementation in amounts typical for human milk (based on local and worldwide surveys) in a large cohort of infants by using sweep visual evoked potential (VEP) acuity as the functional outcome	Test-0.72% ARA + 0.36% DHA (algal oil); or control- unsupplemented. Source: *M. alpina*	Intervention from day 5 to 52 wk	103 term infants	Sweep VEP acuity; Red blood cell DHA concentrations; visual function and total red blood cell lipid composition; growth; gastrointestinal tolerance	Birch et al., 2005
To examine whether feeding infant formula supplemented with ARA/DHA improves cognitive function of 9-month olds	2 groups: 1) formula with 0.72% ARA + 0.36% DHA; or 2) control-unsupplemented formula Source: *M. alpina*	12-month feeding and 6-week weaning studies	229 term infants	Problem solving at 9 mo	Drover et al., 2009

Table 24. Term Infants Studies Included in GRN 329, Continued

Objective	Test Material and Dose	Type and Duration of the Study	Subjects	Measurements	Reference
ARA-Rich Oils Derived from *M. alpina*					
To determine the effect of feeding formula containing long-chain PUFA on immune function in healthy term infants	3 groups: 1) 0.34% ARA and 0.20% DHA (algal) 2) control-unsupplemented; or 3) breast milk Source: *M. alpina*	2-6 wk	46 full term infants	Growth; immune cell distribution (CD3+CD44+ and CD4+CD28+ cells) and cytokine profile (TNF-alpha post-stimulation); the rate of ^{3}H thymidine uptake in response to phytohaemagglutinin	Fields et al., 2008
To evaluate safety, benefits, and growth when supplemented with DHA and ARA formula in infants	3 groups- 1) 21 mg ARA +8 mg algal DHA; 2) 34 mg ARA + DHA 17 mg; or 3) control, non-supplemented formula Source: *M. alpina*	From 14 to 120 d of age	244 healthy term infants	Growth rates; tolerance assessed by stool frequency and characteristics as well as amounts of gas; incidence of atopic dermatitis; ARA/DHA conc. in RBC, and plasma phospholipids	Hoffman et al., 2008

DHA and ARA= percentages in diet given as % of total FA unless noted otherwise. PUFA = polyunsaturated fatty acids; *M. alpina* = *Mortirella alpina*; RBC= red blood cell; RCT = randomized controlled trial; TNF = tumor necrosis factor; VEP = visual evoked potentials.

6.C. Potential adverse effects

The *Mortierella* genus is presently classified in the Order, Mortierellales, and Family, Mortierellaceae. A few organisms in the Order, Mortierellales, have been associated with mucormycosis, a disease resulting from an opportunistic infection. Classic risk groups for mucormycosis infection include individuals who are immunocompromised and those with uncontrolled diabetes (Chew et al., 2008). No references were found in the literature suggesting any specific toxin production by members of the genus, *Mortierella,* with the exception of the pathogenic species *M. wolfii,* a well-known pathogen of cattle. There has never been any report of mycotoxin production from *M. alpina* or any other of the many species of the genus *Mortierella.* Three non-consecutive batches of ARA-rich oil ingredients (both oil and powder forms) showed no detectable mycotoxin contamination.

6.D. Safety Determination

Numerous human and animal studies have reported benefits of ARA-rich oils with no major adverse effects. Linyi Youkang Biology uses a HACCP-controlled manufacturing process and rigorously tests its final production batches to verify adherence to quality control specifications. There is broad-based and widely disseminated knowledge concerning the chemistry of ARA-rich oils. This GRAS determination is based on the data and information generally available for the safety of ARA-rich oil. The literature indicates that ARA-rich oils offer infants health benefits without adverse effects.

The following safety evaluation fully considers the composition, intake, nutritional, microbiological, and toxicological properties of ARA-rich oils as well as appropriate corroborative data.

1. Linyi Youkang Biology's ARA-rich oil ingredients are manufactured under cGMP using common oil industry materials and processes.

2. Analytical data from multiple lots indicate that the ARA-rich oil ingredients (both oil and powder forms) comply reliably with the established food-grade product specifications and meet all applicable purity standards.

3. Linyi Youkang Biology's ARA-rich oil ingredients will be used as food ingredients in infant formulas. Intended use and use levels will be the same as those described in GRNs 326, 80, and 41.

4. An estimate of exposure to ARA from its addition to infant formula is based on mean target ARA concentrations of 0.75% and 0.40% of total fat for term and pre-term infants, respectively. These correspond to intakes of ARA of 42 mg and 27 mg ARA/ kg bw/day (corresponding to 104 and 67 mg of ARA-rich oil/kg bw/day or 420 and 270 mg of ARA-rich oil powder/kg bw/day) for term infants and pre-term infants, respectively.

5. These levels are below the reference dose safe for human exposure. Studies with infants found no adverse effects of ARA supplementation up to 0.91% of total fatty acids.

6. Studies have shown that ARA-rich oils are not mutagenic or genotoxic. In addition, subchronic studies have reported that NOAELs for ARA-rich oils are over 5,000 mg/kg bw/day in male and female rats, respectively.

7. The EDI values are based on the assumption that Linyi Youkang Biology's ARA-rich oil will replace currently marketed ARA ingredients. Thus, cumulative exposures are not expected.

8. In the previous GRAS notices (GRNs 326, 94, 80, and 41) to the FDA, the safety of ARA-rich oils had been established in toxicological studies in animals, mutagenicity studies, and is further supported by clinical studies in humans. The FDA responses to GRAS notifications on ARA-rich oils indicate that the FDA is satisfied with the safety-in-use of the ARA-rich oils as long as consumption simulates ARA content in mothers' milk content.

9. Additional human and animal studies published subsequent to the FDA's last review in 2010 continue to support the safety of ARA-rich oil as a food ingredient.

6.E. Conclusions and General Recognition of the Safety of ARA

Several sources of ARA-rich oils have been evaluated by the FDA and other global regulatory agencies over the past 16 years for proposed incorporation of ARA-rich oils in foods for human consumption. Relevant U.S. GRAS notifications include GRNs 326, 94, 80, and 41 (FDA, 2001a, 2001b, 2006, 2010). All of the GRAS notices provided information/clinical study data that supported the safety of the proposed ARA-rich oil ingredients for use in infant formulas. In all of the studies summarized in these notifications, there were no significant adverse effects/events or tolerance issues attributable to ARA-rich oils derived from *M. alpina.* Because this safety evaluation was based on generally available and widely accepted data and information, it satisfies the so-called "common knowledge" element of a GRAS determination.

In addition, the intended uses of ARA-rich oil ingredients have been determined to be safe though scientific procedures as set forth in 21 CFR 170.3(b), thus satisfying the so-called "technical" element of the GRAS determination. The specifications and composition of Linyi Youkang Biology's ARA-rich oil are almost identical to those that have received FDA no question letters. Linyi Youkang Biology's ARA-rich oil powder has similar specifications and composition although its ARA content is diluted by four times. No toxicants have been detected from Linyi Youkang Biology's ARA-rich oil ingredients.

The ARA-rich oil and powder ingredients that are the subject of this GRAS determination are produced by the non-toxigenic fungus, *M. alpina,* and its purity is over 40% and 10%, respectively. The ARA-rich oil ingredients are manufactured consistent with cGMP for food (21 CFR Part 110 and Part 117 Subpart B). The raw materials and processing aids used in the manufacturing process are food grade and/or commonly used in fermentation and food

manufacturing processes. Literature searches did not identify safety or toxicity concerns related to ARA-rich oil. Toxicity studies of ARA-rich oils include acute, subacute, and subchronic toxicity, a battery of genotoxicity studies, and developmental and reproductive toxicity studies in animals. In all of these reports, no evidence of toxicity was noted at up to 5,000 mg/kg bw/day, the highest dose levels tested, in rats. The publicly available scientific literature on the consumption and safety of ARA-rich oils in infant clinical studies is extensive and sufficient to support the safety and GRAS status of the proposed ARA-rich oil ingredients.

Linyi Youkang Biology also has concluded that ARA-rich oil ingredients are GRAS under the intended conditions of use on the basis of scientific procedures. Therefore, they are excluded from the definition of a food additive and may be marketed and sold for its intended purpose in the U.S. without the promulgation of a food additive regulation under Title 21 of the CFR.

Linyi Youkang Biology is not aware of any information that would be inconsistent with a finding that the proposed use of ARA-rich oil ingredients meets appropriate specifications, and their use according to cGMP, is GRAS.

The information and data provided by Linyi Youkang Biology in this report and supplemented by the publicly available literature and toxicity data on ARA-rich oil ingredients provide a sufficient basis for an assessment of the safety of ARA-rich oil ingredients for the proposed use as an ingredient in food when prepared according to appropriate specifications and used according to cGMP.

6.F. Discussion of information inconsistent with GRAS determination

We are not aware of information that would be inconsistent with a finding that the proposed use of ARA-rich oil ingredients in infant formulas, meeting appropriate specifications and used according to cGMP, is GRAS.

PART 7. REFERENCES

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7.B. Reference That Is Not Generally Available

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Analytical Report .

Sample Code	128-2017-00005021	Report date	28-Jun-2017 .
Certificate No.	AR-17-VV-005521-01		

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Our reference:	128-2017-00005021/ AR-17-VV-005521-01
Client Sample Code:	2017011001
Sample described as:	ARACHIDONIC ACID Powder
Sample Packaging:	Sealed aluminum foil bag
Sample reception date:	02-Jun-2017
Analysis starting date:	02-Jun-2017
Analysis ending date:	28-Jun-2017
Arrival Temperature (°C)	-0.6
Sample Weight	2kg

		Results	Unit	LOQ	LOD
☆ A7165	Patulin (solid/dry samples) Method: Internal method, LC-MS/MS				
	Patulin	**not analyzable**	µg/kg	20	
☆ A7297	Vitamin E (tocopherol profile) Method: EN 12822:2014				
	alpha-Tocopherol (vitamin E)	**23.5**	mg/100 g	0.08	
	beta-Tocopherol (vitamin E)	**<0.5**	mg/100 g	0.5	
	delta-Tocopherol (vitamin E)	**<0.5**	mg/100 g	0.5	
	gamma-Tocopherol (vitamin E)	**<0.5**	mg/100 g	0.5	
	Sum of tocopherols	**23.5**	mg/100 g		
☆ GFL01	Dioxins and Furans (17 PCDD/F) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	1,2,3,4,6,7,8-HeptaCDD	**< 0.217**	pg/g		
	1,2,3,4,6,7,8-HeptaCDF	**< 0.152**	pg/g		
	1,2,3,4,7,8,9-HeptaCDF	**< 0.106**	pg/g		
	1,2,3,4,7,8-HexaCDD	**< 0.103**	pg/g		
	1,2,3,4,7,8-HexaCDF	**< 0.160**	pg/g		
	1,2,3,6,7,8-HexaCDD	**< 0.141**	pg/g		
	1,2,3,6,7,8-HexaCDF	**< 0.146**	pg/g		
	1,2,3,7,8,9-HexaCDD	**< 0.133**	pg/g		
	1,2,3,7,8,9-HexaCDF	**< 0.108**	pg/g		
	1,2,3,7,8-PentaCDD	**< 0.0678**	pg/g		
	1,2,3,7,8-PentaCDF	**< 0.0976**	pg/g		
	2,3,4,6,7,8-HexaCDF	**< 0.133**	pg/g		
	2,3,4,7,8-PentaCDF	**< 0.152**	pg/g		
	2,3,7,8-TetraCDD	**< 0.0515**	pg/g		
	2,3,7,8-TetraCDF	**< 0.141**	pg/g		
	OctaCDD	**< 1.57**	pg/g		
	OctaCDF	**< 0.325**	pg/g		
	WHO(2005)-PCDD/F TEQ (lower-bound)	**Not Detected**	pg/g		
	WHO(2005)-PCDD/F TEQ (upper-bound)	**0.280**	pg/g		
☆ GFL07	polychlorinated biphenyls (12 WHO PCB + 6 ICES PCB) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				

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		Results	Unit	LOQ	LOD
☆ GFL07	polychlorinated biphenyls (12 WHO PCB + 6 ICES PCB) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	PCB 101	< 0.271	ng/g		
	PCB 105	< 10.6	pg/g		
	PCB 114	< 1.44	pg/g		
	PCB 118	< 37.9	pg/g		
	PCB 123	< 1.08	pg/g		
	PCB 126	< 0.678	pg/g		
	PCB 138	< 0.271	ng/g		
	PCB 153	< 0.271	ng/g		
	PCB 156	< 5.96	pg/g		
	PCB 157	< 1.11	pg/g		
	PCB 167	< 2.98	pg/g		
	PCB 169	< 3.25	pg/g		
	PCB 180	< 0.271	ng/g		
	PCB 189	< 1.08	pg/g		
	PCB 28	< 0.271	ng/g		
	PCB 52	< 0.271	ng/g		
	PCB 77	< 27.1	pg/g		
	PCB 81	< 0.732	pg/g		
	Total 6 ndl-PCB (lower-bound)	Not Detected	ng/g		
	Total 6 ndl-PCB (upper-bound)	1.63	ng/g		
	WHO(2005)-PCB TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCB TEQ (upper-bound)	0.170	pg/g		
☆ GFTE1	TEQ-Totals WHO-PCDD/F and PCB Method: Internal method, Calculation				
	WHO(2005)-PCDD/F+PCB TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCDD/F+PCB TEQ (upper-bound)	0.450	pg/g		
☆ J1054	Sulphur (S) Method: DIN EN ISO 11885, mod.				
	Sulphur total (S)	16	mg/kg	2	
☆ J1056	Silicon (Si) Method: DIN EN ISO 11885, mod.				
	Silicon (Si)	6.0	mg/kg	2	
☆ JCSRA	Solvent residues (big scope) Method: Internal method, HS-GC-MS				
	1,1,1,2-Tetrachloroethane	<0.01	mg/kg	0.01	
	1,1,1-Trichloroethane	<0.01	mg/kg	0.01	
	1,1,2-Trichloroethane	<0.01	mg/kg	0.01	
	1,1-Dichloroethane	<0.05	mg/kg	0.05	
	1,2-Dichloroethane	<0.05	mg/kg	0.05	
	2-Butanon (Methylethylketon)	<1	mg/kg	1	
	2-Methylpentane	<1	mg/kg	1	
	3-Methylpentane	<1	mg/kg	1	
	Benzene	<0.01	mg/kg	0.01	
	Bromodichloromethane	<0.05	mg/kg	0.05	
	Chloroform (trichloromethane)	<0.01	mg/kg	0.01	
	cis-Dichloroethene	<0.05	mg/kg	0.05	
	Dibromochloromethane	<0.05	mg/kg	0.05	
	Dichloromethane	<0.05	mg/kg	0.05	
	Ethyl Acetate	<1	mg/kg	1	
	Ethylbenzene	<0.01	mg/kg	0.01	
	m-/-p-Xylene	<0.01	mg/kg	0.01	
	Methylcyclopentane	<1	mg/kg	1	
	n-Heptane	<1	mg/kg	1	
	n-Hexane	<1	mg/kg	1	
	n-Pentane	<1	mg/kg	1	

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		Results	Unit	LOQ	LOD
☆ JCSRA	Solvent residues (big scope) Method: Internal method, HS-GC-MS				
	Styrene	<0.01	mg/kg	0.01	
	Sum 3 chlorinated solvents	Inapplicable	mg/kg		
	Technical Hexane (calculated)	Inapplicable	mg/kg		
	Tetrachloroethene	<0.01	mg/kg	0.01	
	Tetrachloromethane	<0.01	mg/kg	0.01	
	Toluene	<0.01	mg/kg	0.01	
	trans-Dichloroethene	<0.05	mg/kg	0.05	
	Tribromomethane	<0.05	mg/kg	0.05	
	Trichloroethene	<0.01	mg/kg	0.01	
	Xylene (ortho-)	<0.01	mg/kg	0.01	
☆ JJ04T	Phthalate + DEHA Method: Internal method, GC-MS				
	Acetyltributylcitrat (ATBC)	<1	mg/kg	1	
	Benzyl butyl phthalate (BBP)	<1	mg/kg	1	
	Dibutyl phthalate (DBP)	<0.3	mg/kg		0.3
	Diethyl hexyl phthalate (DEHP)	<1	mg/kg	1	
	Diethyl phthalate (DEP)	<1	mg/kg	1	
	Diethylhexyl adipate (DEHA)	<1	mg/kg	1	
	Di-isobutyl phthalate (DiBP)	<0.3	mg/kg		0.3
	Diisodecylphthalate (DIDP)	<5	mg/kg	5	
	Diisononylphthalate (DINP)	<5	mg/kg	5	
	Dimethyl phthalate (DMP)	<1	mg/kg	1	
	DINCH	<5	mg/kg	5	
	Dioctyl phthalate (D-n-OP)	<1	mg/kg	1	
	Triisobutyl phosphate	<1	mg/kg	1	
☆ JJ088	Fumonisine B1, B2, B3 (maize and products derived from maize) Method: Internal Method, LC-MS/MS				
	Fumonisin B1 (FB1)	<20	µg/kg	20	
	Fumonisin B2 (FB2)	<20	µg/kg	20	
	Fumonisin B3 (FB3)	<20	µg/kg	20	
	Fumonisin sum (B1+B2)	<40	µg/kg	40	
	Fumonisin sum (B1+B2+B3)	<60	µg/kg		
☆ JJ0EW	Aflatoxin B1, B2, G1, G2 (spices, special matrix) Method: internal method based on EN 14123				
	Aflatoxin B1	<1	µg/kg	1	
	Aflatoxin B2	<1	µg/kg	1	
	Aflatoxin G1	<1	µg/kg	1	
	Aflatoxin G2	<1	µg/kg	1	
	Sum of all positive Aflatoxins	<4	µg/kg		
☆ JJ0FE	Fusarium toxins (DON, ZON, T2, HT2) Method: Internal method, LC-MS/MS				
	Deoxynivalenol (Vomitoxin)	<20	µg/kg	20	
	HT-2 Toxin	<10	µg/kg	10	
	sum T-2 HT-2 toxin	<20	µg/kg	20	
	T-2 Toxin	<10	µg/kg	10	
	Zearalenone (ZON)	<10	µg/kg	10	
☆ JJ0G5	Ochratoxin A (spices, special matrix) Method: internal method based on EN 14132, IAC-LC-FLD				
	Ochratoxin A (OTA)	<2	µg/kg	2	
☆ JJW2Z	Sterigmatocystin Method: Internal method, LC-MS/MS				
	Sterigmatocystin	<10	µg/kg	10	
☆ QA049	Polynuclear Aromatic Hydrocarbons (GC-MS) Method: Internal method, GC-MS				
	Acenaphthene	<1.0	µg/kg	1	
	Acenaphthylene	<2.0	µg/kg	2	
	Anthracene	<2.0	µg/kg	2	
	Benzo(a)anthracene	<0.50	µg/kg	0.5	
	Benzo(a)pyrene	<0.50	µg/kg	0.5	
	Benzo-(b)-Fluoranthene	<0.50	µg/kg	0.5	

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		Results	Unit	LOQ	LOD
☆ QA049	Polynuclear Aromatic Hydrocarbons (GC-MS) Method: Internal method, GC-MS				
	Benzo(ghi)perylene	<2.0	μg/kg	2	
	Benzo(k)fluoranthene	<3.0	μg/kg	3	
	Chrysene	<0.50	μg/kg	0.5	
	Dibenzo(a,h)anthracene	<3.0	μg/kg	3	
	Fluoranthene	<1.0	μg/kg	1	
	Fluorene	<2.0	μg/kg	2	
	Indeno(1,2,3-cd)pyrene	<2.0	μg/kg	2	
	Naphthalene	<20	μg/kg	20	
	Phenanthrene	<2.0	μg/kg	2	
	Pyrene	<1.0	μg/kg	1	
☆ QA156	Fatty Acid Profile Method: AOAC 996.06				
	C 6:0 (Caproic acid)	<0.020	g/100 g	0.02	
	C 8:0 (Caprylic acid)	<0.020	g/100 g	0.02	
	C 10:0 (Capric acid)	<0.020	g/100 g	0.02	
	C 12:0 (Lauric acid)	<0.020	g/100 g	0.02	
	C 14:0 (Myristic acid)	0.111	g/100 g	0.02	
	C 14:1 (Myristoleic acid)	<0.020	g/100 g	0.02	
	C 15:0 (Pentadecanoic acid)	<0.020	g/100 g	0.02	
	C 15:1 (Pentadecenoic acid)	<0.020	g/100 g	0.02	
	C 16:0 (Palmitic acid)	1.778	g/100 g	0.02	
	C 16:1 (Palmitoleic acid)	0.035	g/100 g	0.02	
	C 17:0 (Margaric acid)	0.065	g/100 g	0.02	
	C 17:1 (Heptadecenoic acid)	<0.020	g/100 g	0.02	
	C 18:0 (Stearic acid)	1.542	g/100 g	0.02	
	C 18:1 (Oleic acid)	1.436	g/100 g	0.02	
	C 18:1n7 (Vaccenic acid)	0.064	g/100 g	0.02	
	C 18:2n6 (Linoleic acid)	1.681	g/100 g	0.02	
	C 18:3n3 (alpha-Linolenic Acid)	<0.020	g/100 g	0.02	
	C 18:3n6 (gamma-Linolenic Acid)	0.622	g/100 g	0.02	
	C 20:0 (Arachidic acid)	0.207	g/100 g	0.02	
	C 20:1 (Eicosenoic acid)	0.084	g/100 g	0.02	
	C 20:2n6 (Eicosodienoic acid)	0.112	g/100 g	0.02	
	C 20:3n3 (Eicosatrienoic acid)	0.057	g/100 g	0.02	
	C 20:3n6 (homo-gamma-Linolenic acid)	1.106	g/100 g	0.02	
	C 20:4n6 (Aracihdonic Acid)	11.314	g/100 g	0.02	
	C 20:5n3 (Eicosapentaenoic acid)	<0.020	g/100 g	0.02	
	C 21:0 (Heneicosanoic acid)	<0.020	g/100 g	0.02	
	C 22:0 (Behenic acid)	0.837	g/100 g	0.02	
	C 22:1n9 (Erucic acid)	<0.020	g/100 g	0.02	
	C 22:2n6 (Docosadienoic acid)	<0.020	g/100 g	0.02	
	C 22:6n3 (Docosahexaenoic acid)	<0.020	g/100 g	0.02	
	C 22-5n3 (Docosapentaenoic acid)	<0.020	g/100 g	0.02	
	C 22-5n6 (Docosapentaenoic acid)	<0.020	g/100 g	0.02	
	C 23:0 (Tricosanoic acid)	<0.020	g/100 g	0.02	
	C 24:0 (Lignoceric acid)	3.111	g/100 g	0.02	
	C 24:1 (Nervonic acid)	0.084	g/100 g	0.02	
	Monounsaturated Fat	1.715	g/100 g	0.02	
	Omega-3 fatty acids	0.055	g/100 g	0.02	
	Omega-6 fatty acids	14.835	g/100 g	0.02	
	Polyunsaturated Fat	14.890	g/100 g	0.02	
	Saturated Fat	7.650	g/100 g	0.02	

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		Results	Unit	LOQ	LOD
☆ QA156	Fatty Acid Profile Method: AOAC 996.06				
	Total Fat	24.31	g/100 g	0.02	
☆ QA184	Arachidonic Acid (ARA) Method: AOCS Ce 1b-89				
	C 20:4n6 (Arachidonic acid)	108.5	mg/g	0.1	
☆ QA934	Trans Fatty Acids, relative area% (GC-FID) Method: AOCS 2a-94				
	Total Trans Fatty Acids	1.35	%	0.05	
☆ SP421	Organochlorine Pesticides, Pyrethroides Method: ASU L00.00-34				
	Screened pesticides	Not Detected			
☆ SP424	Organophosphorus Pesticides Method: ASU L00.00-34				
	Screened pesticides	Not Detected			
☆ SU007	Mercury (AAS) Method: BS EN 13806:2002				
	Mercury (Hg)	<0.005	mg/kg	0.005	
☆ SU051	Manganese (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Manganese (Mn)	0.34	mg/kg	0.1	
☆ SU055	Molybdenum (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Molybdenum (Mo)	<0.1	mg/kg	0.1	
☆ SU056	Nickel (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Nickel (Ni)	<0.1	mg/kg	0.1	
☆ SU05D	Lead (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Lead (Pb)	<0.05	mg/kg	0.05	
☆ SU05E	Arsenic (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Arsenic (As)	<0.1	mg/kg	0.1	
☆ SU05F	Chromium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Chromium (Cr)	<0.1	mg/kg	0.1	
☆ SU05G	Cadmium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Cadmium (Cd)	<0.01	mg/kg	0.01	
☆ SU05H	Iron (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Iron (Fe)	0.73	mg/kg	0.1	
☆ SU05J	Copper (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Copper (Cu)	0.61	mg/kg	0.1	
☆ SU05K	Phosphorus (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Phosphorus (P)	1940	mg/kg	5	
☆ SU207	Peroxide value Method: AOCS Cd 8b-90:2003				
	Peroxide value	<0.05	meq/kg	0.05	
☆ SU21J	Moisture and Volatile matter Method: ISO 662:1998				
	moisture and volatile matter content	2.27	g/100 g	0.01	
◎ SU9QW	Butane residual Method: Internal method, Internal Method GC-MS				
	Butane	Not Detected	mg/kg	1	
◎ SUA4Q	Test of Veterinary Drug and toxin Residues Method: Internal Method, LC-MS				
	24-Methyl Cholesta-5,(25)27-dien-3β-ol	1.8	mg/100 g	0.1	
	24-Methyl Cholesta-5,24(25)-dien-3β-ol	21.6	mg/100 g	0.1	
	24-Methyl Cholesterol	14.8	mg/100 g	10	
	31-Norlanosterol	5.6	mg/100 g	0.1	
	4α-Methyl Zymosterol	7.6	mg/100 g	0.1	
	Beta-sitosterol	11.7	mg/100 g	0.1	
	Brassicasterol	30.9	mg/100 g	0.1	
	Desmosterol	14.3	mg/100 g	0.1	
	Lanosterol	4.8	mg/100 g	0.1	
	Total unknown sterols	57.4	mg/100 g	0.1	
	Zymosterol	4.9	mg/100 g	0.1	
VV00B	Coliforms Method: ISO 4832:2006				
	Coliforms	<10	cfu/g		
VV00D	Yeasts and moulds Method: ISO 21527:2008				

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			Results	Unit	LOQ	LOD
VV00D	Yeasts and moulds	Method: ISO 21527:2008				
	Moulds		<10	cfu/g		
	Yeast		<10	cfu/g		
VV00P	Aerobic plate count	Method: ISO 4833-1:2013				
	Aerobic plate count		<10	cfu/g		

List of screened and not detected molecules (* = limit of quantification)

SP421 Organochlorine Pesticides, Pyrethroides (LOQ* mg/kg)

2.3.4.6-Tetrachloranisol (0.005)	Aclonifen (0.01)	Acrinathrin (0.05)	Aldrin (0.005)	Aldrin/ Dieldrin (Sum) ()	Benfluralin (0.005)
Benzoylprop-ethyl (0.01)	Bifenox (0.02)	Binapacryl (0.02)	Bifenthrin (0.05)	Bromocyclen (0.01)	Bromoxynil-octanoate (0.01)
Butralin (0.02)	Chlordane (total) ()	Chlordane, cis- (0.005)	Chlordane, oxy- (0.005)	Chlordane, trans- (0.005)	Chlorfenapyr (0.01)
Chlorfenprop-methyl (0.02)	Chlorfenson (0.01)	Chloroneb (0.02)	Chlorothalonil (0.01)	Chlorthal-dimethyl (0.005)	Cyfluthrin (0.05)
Cyhalothrin, lambda- (0.05)	Cypermethrin (0.05)	Cyphenothrin (0.05)	DDD, o,p- (0.005)	DDD, p,p'- (0.005)	DDE, o,p- (0.005)
DDE, p,p'- (0.005)	DDT (total) ()	DDT, o,p'- (0.005)	DDT, p,p'- (0.005)	Deltamethrin (0.05)	Dibromobenzophenone, p,p- (0.02)
Dichlobenil (0.01)	Dichlone (0.02)	Dicloran (0.005)	Dichlorobenzophenone, o,p- (0.02)	Dichlorobenzophenone, p,p- (0.02)	Dicofol (sum) ()
Dicofol, o,p- (0.02)	Dicofol, p,p- (0.02)	Dieldrin (0.005)	Dienochlor (0.01)	Dinitramine (0.01)	Dinobuton (0.02)
Endosulfan (total) ()	Endosulfan, alpha- (0.005)	Endosulfan sulphate (0.01)	Endosulfan, beta- (0.005)	Endrin (0.005)	Endrin ketone (0.01)
Ethalfluralin (0.01)	Etridiazole (0.01)	Fenfluthrin (0.05)	Fenpropathrin (0.05)	Fenson (0.01)	Fenvalerate (RR-/SS-Isomers) (0.05)
Fenvalerate (RS-/SR-Isomers) (0.05)	Flubenzimine (0.01)	Fluchloralin (0.01)	Flucythrinate (0.05)	Flumetralin (0.01)	Fluorodifen (0.01)
Fluoroimide (0.02)	Genite (0.01)	Halfenprox (0.05)	HCH isomers (without lindane) ()	HCH, alpha- (0.005)	HCH, beta- (0.005)
HCH, delta- (0.005)	HCH, epsilon- (0.005)	Lindane (gamma-HCH) (0.005)	Heptachlor (0.005)	Heptachlor (sum) ()	Heptachlor epoxide, cis- (0.005)
Heptachlor epoxide, trans- (0.005)	Hexachlorobenzene (HCB) (0.005)	Ioxynil-octanoate (0.01)	Isobenzan (0.005)	Isodrin (0.005)	Isopropalin (0.01)
Methoxychlor (0.01)	Mirex (0.005)	Nitrapyrin (0.01)	Nitrofen (0.01)	Nonachlor, trans- (0.005)	Octachlorstyrene (0.005)
Oxyfluorfen (0.01)	Pendimethalin (0.01)	Pentachloranisole (0.005)	Pentachloroaniline (0.005)	Pentachlorobenzene (0.01)	Pentachlorothioanisole (0.005)
Permethrin (0.05)	Plifenate (0.02)	Polychloroterpene (Camphechlor) (0.5)	Profluralin (0.005)	Quintozene (0.005)	Quintozene (sum) ()
S 421 (0.01)	tau-Fluvalinate (0.05)	Tecnazene (0.005)	Tefluthrin (0.05)	Tetradifon (0.01)	Tetrasul (0.01)
Tralomethrin (0.05)	Transfluthrin (0.05)	Triallate (0.02)	Trichloronat (0.01)	Trifluralin (0.005)	

SP424 Organophosphorus Pesticides (LOQ* mg/kg)

Acephate (0.02)	Azinphos-ethyl (0.05)	Azinphos-methyl (0.05)	Bromfenvinphos (0.02)	Bromophos-methyl (0.02)	Bromophos-ethyl (0.02)
Butamifos (0.02)	Cadusaphos (0.02)	Carbophenothion (0.02)	Carbophenothion-methyl (0.02)	Chlorfenvinphos (0.02)	Chlormephos (0.02)
Chlorpyrifos (-ethyl) (0.02)	Chlorpyrifos-methyl (0.02)	Chlorthion (0.02)	Chlorthiophos (0.02)	Coumaphos (0.1)	Crotoxyphos (0.02)
Crufomate (0.02)	Cyanofenphos (0.05)	Cyanophos (0.02)	Demeton-S-methyl (0.05)	Demeton-S-methyl-sulfone (0.1)	Dialifos (0.02)
Diazinon (0.02)	Dicapthon (0.02)	Dichlofenthion (0.02)	Dichlorvos (0.02)	Dicrotophos (0.02)	Dimefox (0.02)
Dimethoate (0.02)	Dimethylvinphos (0.02)	Dioxabenzofos (0.02)	Dioxathion (0.05)	Disulfoton (0.05)	Disulfoton-sulfon (0.05)
Disulfoton-sulfoxide (0.05)	Ditalimfos (0.02)	Edifenphos (0.05)	Ethion (0.02)	Ethoprophos (0.02)	Etrimfos (0.02)
Fenamiphos (0.02)	Fenamiphos-sulfone (0.05)	Fenamiphos-sulfoxide (0.05)	Fenchlorphos (0.02)	Fenchlorphos oxon (0.05)	Fenitrothion (0.02)
Fensulfothion (0.02)	Fensulfothion-oxon-sulfone (0.05)	Fensulfothion-oxon-sulfoxide (0.05)	Fensulfothion-sulfone (0.05)	Fenthion (0.02)	Fenthion-oxon-sulfone (0.05)
Fenthion-oxon-sulfoxide (0.05)	Fenthion-sulfone (0.05)	Fenthion-sulfoxide (0.05)	Fonofos (0.02)	Formothion (0.02)	Fosthiazate (0.05)
Fosthietan (0.02)	Heptenophos (0.02)	Iodofenphos (0.05)	Iprobenfos (0.02)	Isazophos (0.02)	Isocarbofos (0.02)
Isofenphos (0.02)	Isofenphos-methyl (0.02)	Isoxathion (0.05)	Leptophos (0.05)	Malaoxon (0.02)	Malathion (0.02)
Mecarbam (0.02)	Mephosfolan (0.02)	Merphos (0.05)	Methacriphos (0.02)	Methamidophos (0.02)	Methidathion (0.02)
Mevinphos (0.02)	Monocrotophos (0.02)	Morphothion (0.05)	Omethoate (0.02)	Oxydemeton-methyl (0.1)	Paraoxon-ethyl (0.02)
Paraoxon-methyl (0.02)	Parathion (0.02)	Parathion-methyl (0.02)	Phenkapton (0.05)	Phenthoate (0.02)	Phorate (0.02)
Phorate-sulfone (0.05)	Phorate-sulfoxide (0.05)	Phosalone (0.05)	Phosmet (0.05)	Phosphamidon (0.02)	Pirimiphos-ethyl (0.02)
Pirimiphos-methyl (0.02)	Profenofos (0.02)	Propaphos (0.02)	Propetamphos (0.02)	Prothiofos (0.02)	Prothoate (0.02)
Pyraclofos (0.05)	Pyrazophos (0.05)	Pyridaphenthion (0.02)	Quinalphos (0.02)	Quintiofos (0.02)	Sulfotep (0.02)
Sulprofos (0.05)	TEPP (0.02)	Terbufos (0.02)	Terbufos-sulfone (0.05)	Tetrachlorvinphos (0.02)	Thiometon (0.02)
Tolclofos-methyl (0.02)	Triamiphos (0.05)	Triazophos (0.02)	Trichlorfon (0.1)	Vamidothion (0.05)	

SIGNATURE

(b) (6)

Kevin Fu
Authorized Signatory

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EXPLANATORY NOTE

≥ Greater than or equal to
< Less than
≤ Less than or equal to
N/A means Not applicable

☆ means the test is subcontracted within Eurofins group
◎ means the test is subcontracted outside Eurofins group

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END OF REPORT .

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Analytical Report .

Sample Code	128-2017-00005022	Report date	28-Jun-2017 .
Certificate No.	AR-17-VV-005522-01		

Linyi Youkang Biology Co., Ltd.

Racheal GAO

Lianbang Road, .

Economical and Technical Development Area, .

Linyi City, ShanDong Province .

Our reference:	128-2017-00005022/ AR-17-VV-005522-01
Client Sample Code:	2017020701
Sample described as:	ARACHIDONIC ACID Powder
Sample Packaging:	Sealed aluminum foil bag
Sample reception date:	02-Jun-2017
Analysis starting date:	02-Jun-2017
Analysis ending date:	28-Jun-2017
Arrival Temperature (°C)	-0.6
Sample Weight	2kg

		Results	Unit	LOQ	LOD
☆ A7165	Patulin (solid/dry samples) Method: Internal method, LC-MS/MS				
	Patulin	<20	µg/kg	20	
☆ A7297	Vitamin E (tocopherol profile) Method: EN 12822:2014				
	alpha-Tocopherol (vitamin E)	23.8	mg/100 g	0.08	
	beta-Tocopherol (vitamin E)	<0.5	mg/100 g	0.5	
	delta-Tocopherol (vitamin E)	2.87	mg/100 g	0.5	
	gamma-Tocopherol (vitamin E)	<0.5	mg/100 g	0.5	
	Sum of tocopherols	26.7	mg/100 g		
☆ GFL01	Dioxins and Furans (17 PCDD/F) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	1,2,3,4,6,7,8-HeptaCDD	< 0.218	pg/g		
	1,2,3,4,6,7,8-HeptaCDF	< 0.153	pg/g		
	1,2,3,4,7,8,9-HeptaCDF	< 0.106	pg/g		
	1,2,3,4,7,8-HexaCDD	< 0.104	pg/g		
	1,2,3,4,7,8-HexaCDF	< 0.161	pg/g		
	1,2,3,6,7,8-HexaCDD	< 0.142	pg/g		
	1,2,3,6,7,8-HexaCDF	< 0.147	pg/g		
	1,2,3,7,8,9-HexaCDD	< 0.134	pg/g		
	1,2,3,7,8,9-HexaCDF	< 0.109	pg/g		
	1,2,3,7,8-PentaCDD	< 0.0681	pg/g		
	1,2,3,7,8-PentaCDF	< 0.0981	pg/g		
	2,3,4,6,7,8-HexaCDF	< 0.134	pg/g		
	2,3,4,7,8-PentaCDF	< 0.153	pg/g		
	2,3,7,8-TetraCDD	< 0.0518	pg/g		
	2,3,7,8-TetraCDF	< 0.142	pg/g		
	OctaCDD	< 1.58	pg/g		
	OctaCDF	< 0.327	pg/g		
	WHO(2005)-PCDD/F TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCDD/F TEQ (upper-bound)	0.281	pg/g		
☆ GFL07	polychlorinated biphenyls (12 WHO PCB + 6 ICES PCB) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				

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		Results	Unit	LOQ	LOD
☆ GFL07	polychlorinated biphenyls (12 WHO PCB + 6 ICES PCB) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	PCB 101	< 0.272	ng/g		
	PCB 105	< 10.6	pg/g		
	PCB 114	< 1.44	pg/g		
	PCB 118	< 38.2	pg/g		
	PCB 123	< 1.09	pg/g		
	PCB 126	< 0.681	pg/g		
	PCB 138	< 0.272	ng/g		
	PCB 153	< 0.272	ng/g		
	PCB 156	< 5.99	pg/g		
	PCB 157	< 1.12	pg/g		
	PCB 167	< 3.00	pg/g		
	PCB 169	< 3.27	pg/g		
	PCB 180	< 0.272	ng/g		
	PCB 189	< 1.09	pg/g		
	PCB 28	< 0.272	ng/g		
	PCB 52	< 0.272	ng/g		
	PCB 77	< 27.2	pg/g		
	PCB 81	< 0.736	pg/g		
	Total 6 ndl-PCB (lower-bound)	Not Detected	ng/g		
	Total 6 ndl-PCB (upper-bound)	1.63	ng/g		
	WHO(2005)-PCB TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCB TEQ (upper-bound)	0.171	pg/g		
☆ GFTE1	TEQ-Totals WHO-PCDD/F and PCB Method: Internal method, Calculation				
	WHO(2005)-PCDD/F+PCB TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCDD/F+PCB TEQ (upper-bound)	0.452	pg/g		
☆ J1054	Sulphur (S) Method: DIN EN ISO 11885, mod.				
	Sulphur total (S)	200	mg/kg	2	
☆ J1056	Silicon (Si) Method: DIN EN ISO 11885, mod.				
	Silicon (Si)	8.0	mg/kg	2	
☆ JCSRA	Solvent residues (big scope) Method: Internal method, HS-GC-MS				
	1,1,1,2-Tetrachloroethane	<0.01	mg/kg	0.01	
	1,1,1-Trichloroethane	<0.01	mg/kg	0.01	
	1,1,2-Trichloroethane	<0.01	mg/kg	0.01	
	1,1-Dichloroethane	<0.05	mg/kg	0.05	
	1,2-Dichloroethane	<0.05	mg/kg	0.05	
	2-Butanon (Methylethylketon)	<1	mg/kg	1	
	2-Methylpentane	<1	mg/kg	1	
	3-Methylpentane	<1	mg/kg	1	
	Benzene	<0.01	mg/kg	0.01	
	Bromodichloromethane	<0.05	mg/kg	0.05	
	Chloroform (trichloromethane)	<0.01	mg/kg	0.01	
	cis-Dichloroethene	<0.05	mg/kg	0.05	
	Dibromochloromethane	<0.05	mg/kg	0.05	
	Dichloromethane	<0.05	mg/kg	0.05	
	Ethyl Acetate	<1	mg/kg	1	
	Ethylbenzene	<0.01	mg/kg	0.01	
	m-/-p-Xylene	<0.01	mg/kg	0.01	
	Methylcyclopentane	<1	mg/kg	1	
	n-Heptane	<1	mg/kg	1	
	n-Hexane	<1	mg/kg	1	
	n-Pentane	<1	mg/kg	1	

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		Results	Unit	LOQ	LOD
☆ JCSRA	Solvent residues (big scope) Method: Internal method, HS-GC-MS				
	Styrene	<0.01	mg/kg	0.01	
	Sum 3 chlorinated solvents	Inapplicable	mg/kg		
	Technical Hexane (calculated)	Inapplicable	mg/kg		
	Tetrachloroethene	<0.01	mg/kg	0.01	
	Tetrachloromethane	<0.01	mg/kg	0.01	
	Toluene	<0.01	mg/kg	0.01	
	trans-Dichloroethene	<0.05	mg/kg	0.05	
	Tribromomethane	<0.05	mg/kg	0.05	
	Trichloroethene	<0.01	mg/kg	0.01	
	Xylene (ortho-)	<0.01	mg/kg	0.01	
☆ JJ04T	Phthalate + DEHA Method: Internal method, GC-MS				
	Acetyltributylcitrat (ATBC)	<1	mg/kg	1	
	Benzyl butyl phthalate (BBP)	<1	mg/kg	1	
	Dibutyl phthalate (DBP)	<0.3	mg/kg		0.3
	Diethyl hexyl phthalate (DEHP)	<1	mg/kg	1	
	Diethyl phthalate (DEP)	<1	mg/kg	1	
	Diethylhexyl adipate (DEHA)	<1	mg/kg	1	
	Di-isobutyl phthalate (DiBP)	<0.3	mg/kg		0.3
	Diisodecylphthalate (DIDP)	<5	mg/kg	5	
	Diisononylphthalate (DINP)	<5	mg/kg	5	
	Dimethyl phthalate (DMP)	<1	mg/kg	1	
	DINCH	<5	mg/kg	5	
	Dioctyl phthalate (D-n-OP)	<1	mg/kg	1	
	Triisobutyl phosphate	<1	mg/kg	1	
☆ JJ088	Fumonisine B1, B2, B3 (maize and products derived from maize) Method: Internal Method, LC-MS/MS				
	Fumonisin B1 (FB1)	<20	µg/kg	20	
	Fumonisin B2 (FB2)	<20	µg/kg	20	
	Fumonisin B3 (FB3)	<20	µg/kg	20	
	Fumonisin sum (B1+B2)	<40	µg/kg	40	
	Fumonisin sum (B1+B2+B3)	<60	µg/kg		
☆ JJ0EW	Aflatoxin B1, B2, G1, G2 (spices, special matrix) Method: internal method based on EN 14123				
	Aflatoxin B1	<1	µg/kg	1	
	Aflatoxin B2	<1	µg/kg	1	
	Aflatoxin G1	<1	µg/kg	1	
	Aflatoxin G2	<1	µg/kg	1	
	Sum of all positive Aflatoxins	<4	µg/kg		
☆ JJ0FE	Fusarium toxins (DON, ZON, T2, HT2) Method: Internal method, LC-MS/MS				
	Deoxynivalenol (Vomitoxin)	<20	µg/kg	20	
	HT-2 Toxin	<10	µg/kg	10	
	sum T-2 HT-2 toxin	<20	µg/kg	20	
	T-2 Toxin	<10	µg/kg	10	
	Zearalenone (ZON)	<10	µg/kg	10	
☆ JJ0G5	Ochratoxin A (spices, special matrix) Method: internal method based on EN 14132, IAC-LC-FLD				
	Ochratoxin A (OTA)	<2	µg/kg	2	
☆ JJW2Z	Sterigmatocystin Method: Internal method, LC-MS/MS				
	Sterigmatocystin	<10	µg/kg	10	
☆ QA049	Polynuclear Aromatic Hydrocarbons (GC-MS) Method: Internal method, GC-MS				
	Acenaphthene	<1.0	µg/kg	1	
	Acenaphthylene	<2.0	µg/kg	2	
	Anthracene	<2.0	µg/kg	2	
	Benzo(a)anthracene	<0.50	µg/kg	0.5	
	Benzo(a)pyrene	<0.50	µg/kg	0.5	
	Benzo-(b)-Fluoranthene	<0.50	µg/kg	0.5	

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		Results	Unit	LOQ	LOD
☆ QA049	Polynuclear Aromatic Hydrocarbons (GC-MS) Method: Internal method, GC-MS				
	Benzo(ghi)perylene	<2.0	µg/kg	2	
	Benzo(k)fluoranthene	<3.0	µg/kg	3	
	Chrysene	<0.50	µg/kg	0.5	
	Dibenzo(a,h)anthracene	<3.0	µg/kg	3	
	Fluoranthene	<1.0	µg/kg	1	
	Fluorene	<2.0	µg/kg	2	
	Indeno(1,2,3-cd)pyrene	<2.0	µg/kg	2	
	Naphthalene	<20	µg/kg	20	
	Phenanthrene	<2.0	µg/kg	2	
	Pyrene	<1.0	µg/kg	1	
☆ QA156	Fatty Acid Profile Method: AOAC 996.06				
	C 6:0 (Caproic acid)	<0.020	g/100 g	0.02	
	C 8:0 (Caprylic acid)	<0.020	g/100 g	0.02	
	C 10:0 (Capric acid)	<0.020	g/100 g	0.02	
	C 12:0 (Lauric acid)	<0.020	g/100 g	0.02	
	C 14:0 (Myristic acid)	0.090	g/100 g	0.02	
	C 14:1 (Myristoleic acid)	<0.020	g/100 g	0.02	
	C 15:0 (Pentadecanoic acid)	<0.020	g/100 g	0.02	
	C 15:1 (Pentadecenoic acid)	<0.020	g/100 g	0.02	
	C 16:0 (Palmitic acid)	1.631	g/100 g	0.02	
	C 16:1 (Palmitoleic acid)	0.035	g/100 g	0.02	
	C 17:0 (Margaric acid)	0.058	g/100 g	0.02	
	C 17:1 (Heptadecenoic acid)	<0.020	g/100 g	0.02	
	C 18:0 (Stearic acid)	1.469	g/100 g	0.02	
	C 18:1 (Oleic acid)	1.548	g/100 g	0.02	
	C 18:1n7 (Vaccenic acid)	0.069	g/100 g	0.02	
	C 18:2n6 (Linoleic acid)	2.519	g/100 g	0.02	
	C 18:3n3 (alpha-Linolenic Acid)	<0.020	g/100 g	0.02	
	C 18:3n6 (gamma-Linolenic Acid)	0.550	g/100 g	0.02	
	C 20:0 (Arachidic acid)	0.192	g/100 g	0.02	
	C 20:1 (Eicosenoic acid)	0.065	g/100 g	0.02	
	C 20:2n6 (Eicosodienoic acid)	0.103	g/100 g	0.02	
	C 20:3n3 (Eicosatrienoic acid)	0.050	g/100 g	0.02	
	C 20:3n6 (homo-gamma-Linolenic acid)	1.016	g/100 g	0.02	
	C 20:4n6 (Aracihdonic Acid)	11.372	g/100 g	0.02	
	C 20:5n3 (Eicosapentaenoic acid)	0.032	g/100 g	0.02	
	C 21:0 (Heneicosanoic acid)	<0.020	g/100 g	0.02	
	C 22:0 (Behenic acid)	0.801	g/100 g	0.02	
	C 22:1n9 (Erucic acid)	<0.020	g/100 g	0.02	
	C 22:2n6 (Docosadienoic acid)	<0.020	g/100 g	0.02	
	C 22:6n3 (Docosahexaenoic acid)	<0.020	g/100 g	0.02	
	C 22-5n3 (Docosapentaenoic acid)	<0.020	g/100 g	0.02	
	C 22-5n6 (Docosapentaenoic acid)	<0.020	g/100 g	0.02	
	C 23:0 (Tricosanoic acid)	<0.020	g/100 g	0.02	
	C 24:0 (Lignoceric acid)	3.270	g/100 g	0.02	
	C 24:1 (Nervonic acid)	0.093	g/100 g	0.02	
	Monounsaturated Fat	1.810	g/100 g	0.02	
	Omega-3 fatty acids	0.080	g/100 g	0.02	
	Omega-6 fatty acids	15.560	g/100 g	0.02	
	Polyunsaturated Fat	15.645	g/100 g	0.02	
	Saturated Fat	7.515	g/100 g	0.02	

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		Results	Unit	LOQ	LOD
☆ QA156	Fatty Acid Profile Method: AOAC 996.06				
	Total Fat	25.00	g/100 g	0.02	
☆ QA184	Arachidonic Acid (ARA) Method: AOCS Ce 1b-89				
	C 20:4n6 (Arachidonic acid)	109.1	mg/g	0.1	
☆ QA934	Trans Fatty Acids, relative area% (GC-FID) Method: AOCS 2a-94				
	Total Trans Fatty Acids	0.93	%	0.05	
☆ SP421	Organochlorine Pesticides, Pyrethroides Method: ASU L00.00-34				
	Screened pesticides	Not Detected			
☆ SP424	Organophosphorus Pesticides Method: ASU L00.00-34				
	Screened pesticides	Not Detected			
☆ SU007	Mercury (AAS) Method: BS EN 13806:2002				
	Mercury (Hg)	<0.005	mg/kg	0.005	
☆ SU051	Manganese (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Manganese (Mn)	0.41	mg/kg	0.1	
☆ SU055	Molybdenum (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Molybdenum (Mo)	<0.1	mg/kg	0.1	
☆ SU056	Nickel (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Nickel (Ni)	<0.1	mg/kg	0.1	
☆ SU05D	Lead (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Lead (Pb)	<0.05	mg/kg	0.05	
☆ SU05E	Arsenic (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Arsenic (As)	<0.1	mg/kg	0.1	
☆ SU05F	Chromium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Chromium (Cr)	<0.1	mg/kg	0.1	
☆ SU05G	Cadmium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Cadmium (Cd)	<0.01	mg/kg	0.01	
☆ SU05H	Iron (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Iron (Fe)	1.28	mg/kg	0.1	
☆ SU05J	Copper (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Copper (Cu)	0.57	mg/kg	0.1	
☆ SU05K	Phosphorus (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Phosphorus (P)	1970	mg/kg	5	
☆ SU207	Peroxide value Method: AOCS Cd 8b-90:2003				
	Peroxide value	<0.05	meq/kg	0.05	
☆ SU21J	Moisture and Volatile matter Method: ISO 662:1998				
	moisture and volatile matter content	2.14	g/100 g	0.01	
⊙ SU9QW	Butane residual Method: Internal method, Internal Method GC-MS				
	Butane	Not Detected	mg/kg	1	
⊙ SUA4Q	Test of Veterinary Drug and toxin Residues Method: Internal Method, LC-MS				
	24-Methyl Cholesta-5,(25)27-dien-3β-ol	2.5	mg/100 g	0.1	
	24-Methyl Cholesta-5,24(25)-dien-3β-ol	18.9	mg/100 g	0.1	
	24-Methyl Cholesterol	16.6	mg/100 g	10	
	31-Norlanosterol	3.6	mg/100 g	0.1	
	4α-Methyl Zymosterol	9.7	mg/100 g	0.1	
	Beta-sitosterol	9.7	mg/100 g	0.1	
	Brassicasterol	19.8	mg/100 g	0.1	
	Desmosterol	11.7	mg/100 g	0.1	
	Lanosterol	5.6	mg/100 g	0.1	
	Total unknown sterols	62.7	mg/100 g	0.1	
	Zymosterol	4.7	mg/100 g	0.1	
VV00B	Coliforms Method: ISO 4832:2006				
	Coliforms	<10	cfu/g		
VV00D	Yeasts and moulds Method: ISO 21527:2008				

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			Results	Unit	LOQ	LOD
VV00D	Yeasts and moulds	Method: ISO 21527:2008				
	Moulds		<10	cfu/g		
	Yeast		<10	cfu/g		
VV00P	Aerobic plate count	Method: ISO 4833-1:2013				
	Aerobic plate count		<10	cfu/g		

List of screened and not detected molecules (* = limit of quantification)

SP421 Organochlorine Pesticides, Pyrethroides (LOQ* mg/kg)

2.3.4.6-Tetrachloranisol (0.005)	Aclonifen (0.01)	Acrinathrin (0.05)	Aldrin (0.005)	Aldrin/ Dieldrin (Sum) ()	Benfluralin (0.005)
Benzoylprop-ethyl (0.01)	Bifenox (0.02)	Binapacryl (0.02)	Bifenthrin (0.05)	Bromocyclen (0.01)	Bromoxynil-octanoate (0.01)
Butralin (0.02)	Chlordane (total) ()	Chlordane, cis- (0.005)	Chlordane, oxy- (0.005)	Chlordane, trans- (0.005)	Chlorfenapyr (0.01)
Chlorfenprop-methyl (0.02)	Chlorfenson (0.01)	Chloroneb (0.02)	Chlorothalonil (0.01)	Chlorthal-dimethyl (0.005)	Cyfluthrin (0.05)
Cyhalothrin, lambda- (0.05)	Cypermethrin (0.05)	Cyphenothrin (0.05)	DDD, o,p- (0.005)	DDD, p,p'- (0.005)	DDE, o,p- (0.005)
DDE, p,p'- (0.005)	DDT (total) ()	DDT, o,p'- (0.005)	DDT, p,p'- (0.005)	Deltamethrin (0.05)	Dibromobenzophenone, p,p- (0.02)
Dichlobenil (0.01)	Dichlone (0.02)	Dicloran (0.005)	Dichlorobenzophenone, o,p- (0.02)	Dichlorobenzophenone, p,p- (0.02)	Dicofol (sum) ()
Dicofol, o,p- (0.02)	Dicofol, p,p- (0.02)	Dieldrin (0.005)	Dienochlor (0.01)	Dinitramine (0.01)	Dinobuton (0.02)
Endosulfan (total) ()	Endosulfan, alpha- (0.005)	Endosulfan sulphate (0.01)	Endosulfan, beta- (0.005)	Endrin (0.005)	Endrin ketone (0.01)
Ethalfluralin (0.01)	Etridiazole (0.01)	Fenfluthrin (0.05)	Fenpropathrin (0.05)	Fenson (0.01)	Fenvalerate (RR-/SS-Isomers) (0.05)
Fenvalerate (RS-/SR-Isomers) (0.05)	Flubenzimine (0.01)	Fluchloralin (0.01)	Flucythrinate (0.05)	Flumetralin (0.01)	Fluorodifen (0.01)
Fluoroimide (0.02)	Genite (0.01)	Halfenprox (0.05)	HCH isomers (without lindane) ()	HCH, alpha- (0.005)	HCH, beta- (0.005)
HCH, delta- (0.005)	HCH, epsilon- (0.005)	Lindane (gamma-HCH) (0.005)	Heptachlor (0.005)	Heptachlor (sum) ()	Heptachlor epoxide, cis- (0.005)
Heptachlor epoxide, trans- (0.005)	Hexachlorobenzene (HCB) (0.005)	Ioxynil-octanoate (0.01)	Isobenzan (0.005)	Isodrin (0.005)	Isopropalin (0.01)
Methoxychlor (0.01)	Mirex (0.005)	Nitrapyrin (0.01)	Nitrofen (0.01)	Nonachlor, trans- (0.005)	Octachlorstyrene (0.005)
Oxyfluorfen (0.01)	Pendimethalin (0.01)	Pentachloranisole (0.005)	Pentachloroaniline (0.005)	Pentachlorobenzene (0.01)	Pentachlorothioanisole (0.005)
Permethrin (0.05)	Plifenate (0.02)	Polychloroterpene (Camphechlor) (0.5)	Profluralin (0.005)	Quintozene (0.005)	Quintozene (sum) ()
S 421 (0.01)	tau-Fluvalinate (0.05)	Tecnazene (0.005)	Tefluthrin (0.05)	Tetradifon (0.01)	Tetrasul (0.01)
Tralomethrin (0.05)	Transfluthrin (0.05)	Triallate (0.02)	Trichloronat (0.01)	Trifluralin (0.005)	

SP424 Organophosphorus Pesticides (LOQ* mg/kg)

Acephate (0.02)	Azinphos-ethyl (0.05)	Azinphos-methyl (0.05)	Bromfenvinphos (0.02)	Bromophos-methyl (0.02)	Bromophos-ethyl (0.02)
Butamifos (0.02)	Cadusaphos (0.02)	Carbophenothion (0.02)	Carbophenothion-methyl (0.02)	Chlorfenvinphos (0.02)	Chlormephos (0.02)
Chlorpyrifos (-ethyl) (0.02)	Chlorpyrifos-methyl (0.02)	Chlorthion (0.02)	Chlorthiophos (0.02)	Coumaphos (0.1)	Crotoxyphos (0.02)
Crufomate (0.02)	Cyanofenphos (0.05)	Cyanophos (0.02)	Demeton-S-methyl (0.05)	Demeton-S-methyl-sulfone (0.1)	Dialifos (0.02)
Diazinon (0.02)	Dicapthon (0.02)	Dichlofenthion (0.02)	Dichlorvos (0.02)	Dicrotophos (0.02)	Dimefox (0.02)
Dimethoate (0.02)	Dimethylvinphos (0.02)	Dioxabenzofos (0.02)	Dioxathion (0.05)	Disulfoton (0.05)	Disulfoton-sulfon (0.05)
Disulfoton-sulfoxide (0.05)	Ditalimfos (0.02)	Edifenphos (0.05)	Ethion (0.02)	Ethoprophos (0.02)	Etrimfos (0.02)
Fenamiphos (0.02)	Fenamiphos-sulfone (0.05)	Fenamiphos-sulfoxide (0.05)	Fenchlorphos (0.02)	Fenchlorphos oxon (0.05)	Fenitrothion (0.02)
Fensulfothion (0.02)	Fensulfothion-oxon-sulfone (0.05)	Fensulfothion-oxon-sulfoxide (0.05)	Fensulfothion-sulfone (0.05)	Fenthion (0.02)	Fenthion-oxon-sulfone (0.05)
Fenthion-oxon-sulfoxide (0.05)	Fenthion-sulfone (0.05)	Fenthion-sulfoxide (0.05)	Fonofos (0.02)	Formothion (0.02)	Fosthiazate (0.05)
Fosthietan (0.02)	Heptenophos (0.02)	Iodofenphos (0.05)	Iprobenfos (0.02)	Isazophos (0.02)	Isocarbofos (0.02)
Isofenphos (0.02)	Isofenphos-methyl (0.02)	Isoxathion (0.05)	Leptophos (0.05)	Malaoxon (0.02)	Malathion (0.02)
Mecarbam (0.02)	Mephosfolan (0.02)	Merphos (0.05)	Methacriphos (0.02)	Methamidophos (0.02)	Methidathion (0.02)
Mevinphos (0.02)	Monocrotophos (0.02)	Morphothion (0.05)	Omethoate (0.02)	Oxydemeton-methyl (0.1)	Paraoxon-ethyl (0.02)
Paraoxon-methyl (0.02)	Parathion (0.02)	Parathion-methyl (0.02)	Phenkapton (0.05)	Phenthoate (0.02)	Phorate (0.02)
Phorate-sulfone (0.05)	Phorate-sulfoxide (0.05)	Phosalone (0.05)	Phosmet (0.05)	Phosphamidon (0.02)	Pirimiphos-ethyl (0.02)
Pirimiphos-methyl (0.02)	Profenofos (0.02)	Propaphos (0.02)	Propetamphos (0.02)	Prothiofos (0.02)	Prothoate (0.02)
Pyraclofos (0.05)	Pyrazophos (0.05)	Pyridaphenthion (0.02)	Quinalphos (0.02)	Quintiofos (0.02)	Sulfotep (0.02)
Sulprofos (0.05)	TEPP (0.02)	Terbufos (0.02)	Terbufos-sulfone (0.05)	Tetrachlorvinphos (0.02)	Thiometon (0.02)
Tolclofos-methyl (0.02)	Triamiphos (0.05)	Triazophos (0.02)	Trichlorfon (0.1)	Vamidothion (0.05)	

SIGNATURE (b) (6)

Kevin Fu
Authorized Signatory

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EXPLANATORY NOTE

≥ Greater than or equal to
< Less than
≤ Less than or equal to
N/A means Not applicable

☆ means the test is subcontracted within Eurofins group
◎ means the test is subcontracted outside Eurofins group

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END OF REPORT .

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Analytical Report /

Sample Code	128-2017-00005023	Report date	28-Jun-2017 /
Certificate No.	AR-17-VV-005523-01		

Linyi Youkang Biology Co., Ltd.

Racheal GAO

Lianbang Road, /

Economical and Technical Development Area, /

Linyi City, ShanDong Province /

Our reference:	128-2017-00005023/ AR-17-VV-005523-01
Client Sample Code:	2017030101
Sample described as:	ARACHIDONIC ACID Powder
Sample Packaging:	Sealed aluminum foil bag
Sample reception date:	02-Jun-2017
Analysis starting date:	02-Jun-2017
Analysis ending date:	28-Jun-2017
Arrival Temperature (°C)	-0.6
Sample Weight	2kg

		Results	Unit	LOQ	LOD
☆ A7165	Patulin (solid/dry samples) Method: Internal method, LC-MS/MS				
	Patulin	<20	µg/kg	20	
☆ A7297	Vitamin E (tocopherol profile) Method: EN 12822:2014				
	alpha-Tocopherol (vitamin E)	22.4	mg/100 g	0.08	
	beta-Tocopherol (vitamin E)	<0.5	mg/100 g	0.5	
	delta-Tocopherol (vitamin E)	<0.5	mg/100 g	0.5	
	gamma-Tocopherol (vitamin E)	<0.5	mg/100 g	0.5	
	Sum of tocopherols	22.4	mg/100 g		
☆ GFL01	Dioxins and Furans (17 PCDD/F) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	1,2,3,4,6,7,8-HeptaCDD	< 0.234	pg/g		
	1,2,3,4,6,7,8-HeptaCDF	< 0.164	pg/g		
	1,2,3,4,7,8,9-HeptaCDF	< 0.114	pg/g		
	1,2,3,4,7,8-HexaCDD	< 0.111	pg/g		
	1,2,3,4,7,8-HexaCDF	< 0.173	pg/g		
	1,2,3,6,7,8-HexaCDD	< 0.152	pg/g		
	1,2,3,6,7,8-HexaCDF	< 0.158	pg/g		
	1,2,3,7,8,9-HexaCDD	< 0.143	pg/g		
	1,2,3,7,8,9-HexaCDF	< 0.117	pg/g		
	1,2,3,7,8-PentaCDD	< 0.0731	pg/g		
	1,2,3,7,8-PentaCDF	< 0.105	pg/g		
	2,3,4,6,7,8-HexaCDF	< 0.143	pg/g		
	2,3,4,7,8-PentaCDF	< 0.164	pg/g		
	2,3,7,8-TetraCDD	< 0.0556	pg/g		
	2,3,7,8-TetraCDF	< 0.152	pg/g		
	OctaCDD	< 1.70	pg/g		
	OctaCDF	< 0.351	pg/g		
	WHO(2005)-PCDD/F TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCDD/F TEQ (upper-bound)	0.302	pg/g		
☆ GFL07	polychlorinated biphenyls (12 WHO PCB + 6 ICES PCB) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				

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		Results	Unit	LOQ	LOD
☆ GFL07	polychlorinated biphenyls (12 WHO PCB + 6 ICES PCB) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	PCB 101	< 0.292	ng/g		
	PCB 105	< 11.4	pg/g		
	PCB 114	< 1.55	pg/g		
	PCB 118	< 40.9	pg/g		
	PCB 123	< 1.17	pg/g		
	PCB 126	< 0.731	pg/g		
	PCB 138	< 0.292	ng/g		
	PCB 153	< 0.292	ng/g		
	PCB 156	< 6.43	pg/g		
	PCB 157	< 1.20	pg/g		
	PCB 167	< 3.22	pg/g		
	PCB 169	< 3.51	pg/g		
	PCB 180	< 0.292	ng/g		
	PCB 189	< 1.17	pg/g		
	PCB 28	< 0.292	ng/g		
	PCB 52	< 0.292	ng/g		
	PCB 77	< 29.2	pg/g		
	PCB 81	< 0.789	pg/g		
	Total 6 ndl-PCB (lower-bound)	Not Detected	ng/g		
	Total 6 ndl-PCB (upper-bound)	1.75	ng/g		
	WHO(2005)-PCB TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCB TEQ (upper-bound)	0.184	pg/g		
☆ GFTE1	TEQ-Totals WHO-PCDD/F and PCB Method: Internal method, Calculation				
	WHO(2005)-PCDD/F+PCB TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCDD/F+PCB TEQ (upper-bound)	0.485	pg/g		
☆ J1054	Sulphur (S) Method: DIN EN ISO 11885, mod.				
	Sulphur total (S)	16	mg/kg	2	
☆ J1056	Silicon (Si) Method: DIN EN ISO 11885, mod.				
	Silicon (Si)	6.0	mg/kg	2	
☆ JCSRA	Solvent residues (big scope) Method: Internal method, HS-GC-MS				
	1,1,1,2-Tetrachloroethane	<0.01	mg/kg	0.01	
	1,1,1-Trichloroethane	<0.01	mg/kg	0.01	
	1,1,2-Trichloroethane	<0.01	mg/kg	0.01	
	1,1-Dichloroethane	<0.05	mg/kg	0.05	
	1,2-Dichloroethane	<0.05	mg/kg	0.05	
	2-Butanon (Methylethylketon)	<1	mg/kg	1	
	2-Methylpentane	<1	mg/kg	1	
	3-Methylpentane	<1	mg/kg	1	
	Benzene	<0.01	mg/kg	0.01	
	Bromodichloromethane	<0.05	mg/kg	0.05	
	Chloroform (trichloromethane)	<0.01	mg/kg	0.01	
	cis-Dichloroethene	<0.05	mg/kg	0.05	
	Dibromochloromethane	<0.05	mg/kg	0.05	
	Dichloromethane	<0.05	mg/kg	0.05	
	Ethyl Acetate	<1	mg/kg	1	
	Ethylbenzene	<0.01	mg/kg	0.01	
	m-/-p-Xylene	<0.01	mg/kg	0.01	
	Methylcyclopentane	<1	mg/kg	1	
	n-Heptane	<1	mg/kg	1	
	n-Hexane	<1	mg/kg	1	
	n-Pentane	<1	mg/kg	1	

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		Results	Unit	LOQ	LOD
☆ JCSRA	Solvent residues (big scope) Method: Internal method, HS-GC-MS				
	Styrene	<0.01	mg/kg	0.01	
	Sum 3 chlorinated solvents	Inapplicable	mg/kg		
	Technical Hexane (calculated)	Inapplicable	mg/kg		
	Tetrachloroethene	<0.01	mg/kg	0.01	
	Tetrachloromethane	<0.01	mg/kg	0.01	
	Toluene	<0.01	mg/kg	0.01	
	trans-Dichloroethene	<0.05	mg/kg	0.05	
	Tribromomethane	<0.05	mg/kg	0.05	
	Trichloroethene	<0.01	mg/kg	0.01	
	Xylene (ortho-)	<0.01	mg/kg	0.01	
☆ JJ04T	Phthalate + DEHA Method: Internal method, GC-MS				
	Acetyltributylcitrat (ATBC)	<1	mg/kg	1	
	Benzyl butyl phthalate (BBP)	<1	mg/kg	1	
	Dibutyl phthalate (DBP)	<0.3	mg/kg		0.3
	Diethyl hexyl phthalate (DEHP)	<1	mg/kg	1	
	Diethyl phthalate (DEP)	<1	mg/kg	1	
	Diethylhexyl adipate (DEHA)	<1	mg/kg	1	
	Di-isobutyl phthalate (DiBP)	<0.3	mg/kg		0.3
	Diisodecylphthalate (DIDP)	<5	mg/kg	5	
	Diisononylphthalate (DINP)	<5	mg/kg	5	
	Dimethyl phthalate (DMP)	<1	mg/kg	1	
	DINCH	<5	mg/kg	5	
	Dioctyl phthalate (D-n-OP)	<1	mg/kg	1	
	Triisobutyl phosphate	<1	mg/kg	1	
☆ JJ088	Fumonisine B1, B2, B3 (maize and products derived from maize) Method: Internal Method, LC-MS/MS				
	Fumonisin B1 (FB1)	<20	µg/kg	20	
	Fumonisin B2 (FB2)	<20	µg/kg	20	
	Fumonisin B3 (FB3)	<20	µg/kg	20	
	Fumonisin sum (B1+B2)	<40	µg/kg	40	
	Fumonisin sum (B1+B2+B3)	<60	µg/kg		
☆ JJ0EW	Aflatoxin B1, B2, G1, G2 (spices, special matrix) Method: internal method based on EN 14123				
	Aflatoxin B1	<1	µg/kg	1	
	Aflatoxin B2	<1	µg/kg	1	
	Aflatoxin G1	<1	µg/kg	1	
	Aflatoxin G2	<1	µg/kg	1	
	Sum of all positive Aflatoxins	<4	µg/kg		
☆ JJ0FE	Fusarium toxins (DON, ZON, T2, HT2) Method: Internal method, LC-MS/MS				
	Deoxynivalenol (Vomitoxin)	<20	µg/kg	20	
	HT-2 Toxin	<10	µg/kg	10	
	sum T-2 HT-2 toxin	<20	µg/kg	20	
	T-2 Toxin	<10	µg/kg	10	
	Zearalenone (ZON)	<10	µg/kg	10	
☆ JJ0G5	Ochratoxin A (spices, special matrix) Method: internal method based on EN 14132, IAC-LC-FLD				
	Ochratoxin A (OTA)	<2	µg/kg	2	
☆ JJW2Z	Sterigmatocystin Method: Internal method, LC-MS/MS				
	Sterigmatocystin	<10	µg/kg	10	
☆ QA049	Polynuclear Aromatic Hydrocarbons (GC-MS) Method: Internal method, GC-MS				
	Acenaphthene	<1.0	µg/kg	1	
	Acenaphthylene	<2.0	µg/kg	2	
	Anthracene	<2.0	µg/kg	2	
	Benzo(a)anthracene	<0.50	µg/kg	0.5	
	Benzo(a)pyrene	<0.50	µg/kg	0.5	
	Benzo-(b)-Fluoranthene	<0.50	µg/kg	0.5	

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		Results	Unit	LOQ	LOD
☆ QA049	Polynuclear Aromatic Hydrocarbons (GC-MS) Method: Internal method, GC-MS				
	Benzo(ghi)perylene	<2.0	µg/kg	2	
	Benzo(k)fluoranthene	<3.0	µg/kg	3	
	Chrysene	<0.50	µg/kg	0.5	
	Dibenzo(a,h)anthracene	<3.0	µg/kg	3	
	Fluoranthene	<1.0	µg/kg	1	
	Fluorene	<2.0	µg/kg	2	
	Indeno(1,2,3-cd)pyrene	<2.0	µg/kg	2	
	Naphthalene	<20	µg/kg	20	
	Phenanthrene	<2.0	µg/kg	2	
	Pyrene	<1.0	µg/kg	1	
☆ QA156	Fatty Acid Profile Method: AOAC 996.06				
	C 6:0 (Caproic acid)	<0.020	g/100 g	0.02	
	C 8:0 (Caprylic acid)	<0.020	g/100 g	0.02	
	C 10:0 (Capric acid)	<0.020	g/100 g	0.02	
	C 12:0 (Lauric acid)	<0.020	g/100 g	0.02	
	C 14:0 (Myristic acid)	0.110	g/100 g	0.02	
	C 14:1 (Myristoleic acid)	<0.020	g/100 g	0.02	
	C 15:0 (Pentadecanoic acid)	<0.020	g/100 g	0.02	
	C 15:1 (Pentadecenoic acid)	<0.020	g/100 g	0.02	
	C 16:0 (Palmitic acid)	1.775	g/100 g	0.02	
	C 16:1 (Palmitoleic acid)	0.033	g/100 g	0.02	
	C 17:0 (Margaric acid)	0.065	g/100 g	0.02	
	C 17:1 (Heptadecenoic acid)	<0.020	g/100 g	0.02	
	C 18:0 (Stearic acid)	1.539	g/100 g	0.02	
	C 18:1 (Oleic acid)	1.434	g/100 g	0.02	
	C 18:1n7 (Vaccenic acid)	0.064	g/100 g	0.02	
	C 18:2n6 (Linoleic acid)	1.674	g/100 g	0.02	
	C 18:3n3 (alpha-Linolenic Acid)	<0.020	g/100 g	0.02	
	C 18:3n6 (gamma-Linolenic Acid)	0.621	g/100 g	0.02	
	C 20:0 (Arachidic acid)	0.206	g/100 g	0.02	
	C 20:1 (Eicosenoic acid)	0.084	g/100 g	0.02	
	C 20:2n6 (Eicosodienoic acid)	0.112	g/100 g	0.02	
	C 20:3n3 (Eicosatrienoic acid)	0.054	g/100 g	0.02	
	C 20:3n6 (homo-gamma-Linolenic acid)	1.105	g/100 g	0.02	
	C 20:4n6 (Aracihdonic Acid)	11.282	g/100 g	0.02	
	C 20:5n3 (Eicosapentaenoic acid)	<0.020	g/100 g	0.02	
	C 21:0 (Heneicosanoic acid)	<0.020	g/100 g	0.02	
	C 22:0 (Behenic acid)	0.833	g/100 g	0.02	
	C 22:1n9 (Erucic acid)	<0.020	g/100 g	0.02	
	C 22:2n6 (Docosadienoic acid)	<0.020	g/100 g	0.02	
	C 22:6n3 (Docosahexaenoic acid)	<0.020	g/100 g	0.02	
	C 22-5n3 (Docosapentaenoic acid)	<0.020	g/100 g	0.02	
	C 22-5n6 (Docosapentaenoic acid)	<0.020	g/100 g	0.02	
	C 23:0 (Tricosanoic acid)	<0.020	g/100 g	0.02	
	C 24:0 (Lignoceric acid)	3.086	g/100 g	0.02	
	C 24:1 (Nervonic acid)	0.085	g/100 g	0.02	
	Monounsaturated Fat	1.700	g/100 g	0.02	
	Omega-3 fatty acids	0.050	g/100 g	0.02	
	Omega-6 fatty acids	14.795	g/100 g	0.02	
	Polyunsaturated Fat	14.850	g/100 g	0.02	
	Saturated Fat	7.615	g/100 g	0.02	

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		Results	Unit	LOQ	LOD
☆ QA156	Fatty Acid Profile Method: AOAC 996.06				
	Total Fat	24.22	g/100 g	0.02	
☆ QA184	Arachidonic Acid (ARA) Method: AOCS Ce 1b-89				
	C 20:4n6 (Arachidonic acid)	108.2	mg/g	0.1	
☆ QA934	Trans Fatty Acids, relative area% (GC-FID) Method: AOCS 2a-94				
	Total Trans Fatty Acids	1.35	%	0.05	
☆ SP421	Organochlorine Pesticides, Pyrethroides Method: ASU L00.00-34				
	Screened pesticides	Not Detected			
☆ SP424	Organophosphorus Pesticides Method: ASU L00.00-34				
	Screened pesticides	Not Detected			
☆ SU007	Mercury (AAS) Method: BS EN 13806:2002				
	Mercury (Hg)	<0.005	mg/kg	0.005	
☆ SU051	Manganese (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Manganese (Mn)	0.33	mg/kg	0.1	
☆ SU055	Molybdenum (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Molybdenum (Mo)	<0.1	mg/kg	0.1	
☆ SU056	Nickel (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Nickel (Ni)	<0.1	mg/kg	0.1	
☆ SU05D	Lead (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Lead (Pb)	<0.05	mg/kg	0.05	
☆ SU05E	Arsenic (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Arsenic (As)	<0.1	mg/kg	0.1	
☆ SU05F	Chromium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Chromium (Cr)	<0.1	mg/kg	0.1	
☆ SU05G	Cadmium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Cadmium (Cd)	<0.01	mg/kg	0.01	
☆ SU05H	Iron (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Iron (Fe)	0.96	mg/kg	0.1	
☆ SU05J	Copper (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Copper (Cu)	0.60	mg/kg	0.1	
☆ SU05K	Phosphorus (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Phosphorus (P)	1960	mg/kg	5	
☆ SU207	Peroxide value Method: AOCS Cd 8b-90:2003				
	Peroxide value	<0.05	meq/kg	0.05	
☆ SU21J	Moisture and Volatile matter Method: ISO 662:1998				
	moisture and volatile matter content	2.28	g/100 g	0.01	
◎ SU9QW	Butane residual Method: Internal method, Internal Method GC-MS				
	Butane	Not Detected	mg/kg	1	
◎ SUA4Q	Test of Veterinary Drug and toxin Residues Method: Internal Method, LC-MS				
	24-Methyl Cholesta-5,(25)27-dien-3β-ol	3.1	mg/100 g	0.1	
	24-Methyl Cholesta-5,24(25)-dien-3β-ol	14.3	mg/100 g	0.1	
	24-Methyl Cholesterol	15.2	mg/100 g	10	
	31-Norlanosterol	6.8	mg/100 g	0.1	
	4α-Methyl Zymosterol	7.7	mg/100 g	0.1	
	Beta-sitosterol	8.5	mg/100 g	0.1	
	Brassicasterol	12.8	mg/100 g	0.1	
	Desmosterol	14.7	mg/100 g	0.1	
	Lanosterol	4.2	mg/100 g	0.1	
	Total unknown sterols	59.5	mg/100 g	0.1	
	Zymosterol	5.9	mg/100 g	0.1	
VV00B	Coliforms Method: ISO 4832:2006				
	Coliforms	<10	cfu/g		
VV00D	Yeasts and moulds Method: ISO 21527:2008				

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			Results	Unit	LOQ	LOD
VV00D	Yeasts and moulds	Method: ISO 21527:2008				
	Moulds		<10	cfu/g		
	Yeast		<10	cfu/g		
VV00P	Aerobic plate count	Method: ISO 4833-1:2013				
	Aerobic plate count		<10	cfu/g		

List of screened and not detected molecules (* = limit of quantification)

SP421 Organochlorine Pesticides, Pyrethroides (LOQ* mg/kg)

2.3.4.6-Tetrachloranisol (0.005)	Aclonifen (0.01)	Acrinathrin (0.05)	Aldrin (0.005)	Aldrin/ Dieldrin (Sum) ()	Benfluralin (0.005)
Benzoylprop-ethyl (0.01)	Bifenox (0.02)	Binapacryl (0.02)	Bifenthrin (0.05)	Bromocyclen (0.01)	Bromoxynil-octanoate (0.01)
Butralin (0.02)	Chlordane (total) ()	Chlordane, cis- (0.005)	Chlordane, oxy- (0.005)	Chlordane, trans- (0.005)	Chlorfenapyr (0.01)
Chlorfenprop-methyl (0.02)	Chlorfenson (0.01)	Chloroneb (0.02)	Chlorothalonil (0.01)	Chlorthal-dimethyl (0.005)	Cyfluthrin (0.05)
Cyhalothrin, lambda- (0.05)	Cypermethrin (0.05)	Cyphenothrin (0.05)	DDD, o,p- (0.005)	DDD, p,p'- (0.005)	DDE, o,p- (0.005)
DDE, p,p'- (0.005)	DDT (total) ()	DDT, o,p'- (0.005)	DDT, p,p'- (0.005)	Deltamethrin (0.05)	Dibromobenzophenone, p,p- (0.02)
Dichlobenil (0.01)	Dichlone (0.02)	Dicloran (0.005)	Dichlorobenzophenone, o,p- (0.02)	Dichlorobenzophenone, p,p- (0.02)	Dicofol (sum) ()
Dicofol, o,p- (0.02)	Dicofol, p,p- (0.02)	Dieldrin (0.005)	Dienochlor (0.01)	Dinitramine (0.01)	Dinobuton (0.02)
Endosulfan (total) ()	Endosulfan, alpha- (0.005)	Endosulfan sulphate (0.01)	Endosulfan, beta- (0.005)	Endrin (0.005)	Endrin ketone (0.01)
Ethalfluralin (0.01)	Etridiazole (0.01)	Fenfluthrin (0.05)	Fenpropathrin (0.05)	Fenson (0.01)	Fenvalerate (RR-/SS-Isomers) (0.05)
Fenvalerate (RS-/SR-Isomers) (0.05)	Flubenzimine (0.01)	Fluchloralin (0.01)	Flucythrinate (0.05)	Flumetralin (0.01)	Fluorodifen (0.01)
Fluoroimide (0.02)	Genite (0.01)	Halfenprox (0.05)	HCH isomers (without lindane) ()	HCH, alpha- (0.005)	HCH, beta- (0.005)
HCH, delta- (0.005)	HCH, epsilon- (0.005)	Lindane (gamma-HCH) (0.005)	Heptachlor (0.005)	Heptachlor (sum) ()	Heptachlor epoxide, cis- (0.005)
Heptachlor epoxide, trans- (0.005)	Hexachlorobenzene (HCB) (0.005)	Ioxynil-octanoate (0.01)	Isobenzan (0.005)	Isodrin (0.005)	Isopropalin (0.01)
Methoxychlor (0.01)	Mirex (0.005)	Nitrapyrin (0.01)	Nitrofen (0.01)	Nonachlor, trans- (0.005)	Octachlorstyrene (0.005)
Oxyfluorfen (0.01)	Pendimethalin (0.01)	Pentachloranisole (0.005)	Pentachloroaniline (0.005)	Pentachlorobenzene (0.01)	Pentachlorothioanisole (0.005)
Permethrin (0.05)	Plifenate (0.02)	Polychloroterpene (Camphechlor) (0.5)	Profluralin (0.005)	Quintozene (0.005)	Quintozene (sum) ()
S 421 (0.01)	tau-Fluvalinate (0.05)	Tecnazene (0.005)	Tefluthrin (0.05)	Tetradifon (0.01)	Tetrasul (0.01)
Tralomethrin (0.05)	Transfluthrin (0.05)	Triallate (0.02)	Trichloronat (0.01)	Trifluralin (0.005)	

SP424 Organophosphorus Pesticides (LOQ* mg/kg)

Acephate (0.02)	Azinphos-ethyl (0.05)	Azinphos-methyl (0.05)	Bromfenvinphos (0.02)	Bromophos-methyl (0.02)	Bromophos-ethyl (0.02)
Butamifos (0.02)	Cadusaphos (0.02)	Carbophenothion (0.02)	Carbophenothion-methyl (0.02)	Chlorfenvinphos (0.02)	Chlormephos (0.02)
Chlorpyrifos (-ethyl) (0.02)	Chlorpyrifos-methyl (0.02)	Chlorthion (0.02)	Chlorthiophos (0.02)	Coumaphos (0.1)	Crotoxyphos (0.02)
Crufomate (0.02)	Cyanofenphos (0.05)	Cyanophos (0.02)	Demeton-S-methyl (0.05)	Demeton-S-methyl-sulfone (0.1)	Dialifos (0.02)
Diazinon (0.02)	Dicapthon (0.02)	Dichlofenthion (0.02)	Dichlorvos (0.02)	Dicrotophos (0.02)	Dimefox (0.02)
Dimethoate (0.02)	Dimethylvinphos (0.02)	Dioxabenzofos (0.02)	Dioxathion (0.05)	Disulfoton (0.05)	Disulfoton-sulfon (0.05)
Disulfoton-sulfoxide (0.05)	Ditalimfos (0.02)	Edifenphos (0.05)	Ethion (0.02)	Ethoprophos (0.02)	Etrimfos (0.02)
Fenamiphos (0.02)	Fenamiphos-sulfone (0.05)	Fenamiphos-sulfoxide (0.05)	Fenchlorphos (0.02)	Fenchlorphos oxon (0.05)	Fenitrothion (0.02)
Fensulfothion (0.02)	Fensulfothion-oxon-sulfone (0.05)	Fensulfothion-oxon-sulfoxide (0.05)	Fensulfothion-sulfone (0.05)	Fenthion (0.02)	Fenthion-oxon-sulfone (0.05)
Fenthion-oxon-sulfoxide (0.05)	Fenthion-sulfone (0.05)	Fenthion-sulfoxide (0.05)	Fonofos (0.02)	Formothion (0.02)	Fosthiazate (0.05)
Fosthietan (0.02)	Heptenophos (0.02)	Iodofenphos (0.05)	Iprobenfos (0.02)	Isazophos (0.02)	Isocarbofos (0.02)
Isofenphos (0.02)	Isofenphos-methyl (0.02)	Isoxathion (0.05)	Leptophos (0.05)	Malaoxon (0.02)	Malathion (0.02)
Mecarbam (0.02)	Mephosfolan (0.02)	Merphos (0.05)	Methacriphos (0.02)	Methamidophos (0.02)	Methidathion (0.02)
Mevinphos (0.02)	Monocrotophos (0.02)	Morphothion (0.05)	Omethoate (0.02)	Oxydemeton-methyl (0.1)	Paraoxon-ethyl (0.02)
Paraoxon-methyl (0.02)	Parathion (0.02)	Parathion-methyl (0.02)	Phenkapton (0.05)	Phenthoate (0.02)	Phorate (0.02)
Phorate-sulfone (0.05)	Phorate-sulfoxide (0.05)	Phosalone (0.05)	Phosmet (0.05)	Phosphamidon (0.02)	Pirimiphos-ethyl (0.02)
Pirimiphos-methyl (0.02)	Profenofos (0.02)	Propaphos (0.02)	Propetamphos (0.02)	Prothiofos (0.02)	Prothoate (0.02)
Pyraclofos (0.05)	Pyrazophos (0.05)	Pyridaphenthion (0.02)	Quinalphos (0.02)	Quintiofos (0.02)	Sulfotep (0.02)
Sulprofos (0.05)	TEPP (0.02)	Terbufos (0.02)	Terbufos-sulfone (0.05)	Tetrachlorvinphos (0.02)	Thiometon (0.02)
Tolclofos-methyl (0.02)	Triamiphos (0.05)	Triazophos (0.02)	Trichlorfon (0.1)	Vamidothion (0.05)	

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EXPLANATORY NOTE

≥ Greater than or equal to
< Less than
≤ Less than or equal to
N/A means Not applicable

☆ means the test is subcontracted within Eurofins group
◎ means the test is subcontracted outside Eurofins group

For and on behalf of Eurofins Technology Service (Qingdao) Co., Ltd. /

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Analytical Report .

Sample Code	128-2017-00008162	Report date	18-Aug-2017 .
Certificate No.	AR-17-VV-007753-01		

Linyi Youkang Biology Co., Ltd.

Racheal GAO

Lianbang Road, .

Economical and Technical Development Area, .

Linyi City, ShanDong Province .

Our reference:	128-2017-00008162/ AR-17-VV-007753-01
Client Sample Code:	A2017030201 A2017031001 A2017031701
Sample described as:	ARACHIDONIC ACID OIL
Sample Packaging:	Sealed metal bottle
Sample reception date:	07-Aug-2017
Analysis starting date:	07-Aug-2017
Analysis ending date:	18-Aug-2017
Arrival Temperature (°C)	5
Sample Weight	50g

		Results	Unit	LOQ	LOD
☆ FL023	Plant sterols and plant stanols (not enriched) Method: NMKL 198:2014				
	24-Methylenecycloartanol	<1	mg/100 g	1	
	Brassicasterol	125	mg/100 g	1	
	Campesterol	33	mg/100 g	1	
	Cholesterol	1	mg/100 g	1	
	Citrostadienol	1	mg/100 g	1	
	Cycloartenol	1	mg/100 g	1	
	Delta-5,24-stigmastadienol	5	mg/100 g	1	
	delta-7-Avenasterol	1	mg/100 g	1	
	Delta-7-stigmastenol	2	mg/100 g	1	
	Sitostanol+ delta-5-avenasterol	4	mg/100 g	1	
	Sitosterol	51	mg/100 g	1	
	Stigmasterol	6	mg/100 g	1	
	Total plant sterols + plant stanols	861	mg/100 g	1	
	Unidentified sterols	633	mg/100 g	1	

COMMENT

Due to the sample matrix the results are reported without accrediation. This sample seems to contain unusual phytosterols and, therefore, the peak identifications have to be treated only tentative.

Cholesterol is not included in the sum of plant sterols and plant stanols.

The analysis of 24-Methylene-Cholesterol does not belong to our normal scope, but the component has been tentatively identified based on ISO 12228 standard method eluting just in front of Campesterol in the chromatogram.

SIGNATURE (b) (6)

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EXPLANATORY NOTE

≥ Greater than or equal to
< Less than
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N/A means Not applicable

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Analytical Report

Sample Code	128-2017-00005024	Report date	27-Jun-2017
Certificate No.	AR-17-VV-005478-01		

Linyi Youkang Biology Co., Ltd.

Racheal GAO
Lianbang Road,
Economical and Technical Development Area,
Linyi City, ShanDong Province

Our reference:	128-2017-00005024/ AR-17-VV-005478-01
Client Sample Code:	A2017030201
Sample described as:	ARACHIDONIC ACID OIL
Sample Packaging:	Sealed metal bottle
Sample reception date:	02-Jun-2017
Analysis starting date:	02-Jun-2017
Analysis ending date:	27-Jun-2017
Arrival Temperature (°C)	-16.6
Sample Weight	3kg

		Results	Unit	LOQ	LOD
☆ A7165	Patulin (solid/dry samples) Method: Internal method, LC-MS/MS				
	Patulin	<20	µg/kg	20	
☆ AS403	Haloxyfop Method: Internal method, GC-MS				
	Haloxyfop (total, after hydrolysis)	< 0.003	mg/kg	0.003	
☆ DJPFG	Vitamin E profile in Margarine, Butter, Fats & Oils. Tocopherole profile Method: EN 12822:2014				
	alpha-Tocopherol (vitamin E)	96.2	mg/100 g	0.5	
	beta-Tocopherol (vitamin E)	<0.5	mg/100 g	0.5	
	delta-Tocopherol (vitamin E)	<0.5	mg/100 g	0.5	
	gamma-Tocopherol (vitamin E)	<0.5	mg/100 g	0.5	
	sum tocopherols	96.2	mg/100 g		
☆ DJTTG	Tocotrienols in fats and oils Method: ISO 9936:2006				
	alpha-Tocotrienol	0.370	mg/100 g	0.08	
	beta-Tocotrienol	<0.5	mg/100 g	0.5	
	delta-Tocotrienol	<0.5	mg/100 g	0.5	
	gamma-Tocotrienol	<0.5	mg/100 g	0.5	
	Tocotrienols Total	0.370	mg/100 g		
☆ GFL01	Dioxins and Furans (17 PCDD/F) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	1,2,3,4,6,7,8-HeptaCDD	< 0.133	pg/g		
	1,2,3,4,6,7,8-HeptaCDF	< 0.0933	pg/g		
	1,2,3,4,7,8,9-HeptaCDF	< 0.0650	pg/g		
	1,2,3,4,7,8-HexaCDD	< 0.0633	pg/g		
	1,2,3,4,7,8-HexaCDF	< 0.0983	pg/g		
	1,2,3,6,7,8-HexaCDD	< 0.0867	pg/g		
	1,2,3,6,7,8-HexaCDF	< 0.0900	pg/g		
	1,2,3,7,8,9-HexaCDD	< 0.0817	pg/g		
	1,2,3,7,8,9-HexaCDF	< 0.0667	pg/g		
	1,2,3,7,8-PentaCDD	< 0.0417	pg/g		
	1,2,3,7,8-PentaCDF	< 0.0600	pg/g		
	2,3,4,6,7,8-HexaCDF	< 0.0817	pg/g		
	2,3,4,7,8-PentaCDF	< 0.0933	pg/g		
	2,3,7,8-TetraCDD	< 0.0317	pg/g		

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		Results	Unit	LOQ	LOD
☆ GFL01	Dioxins and Furans (17 PCDD/F) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	2,3,7,8-TetraCDF	< 0.0867	pg/g		
	OctaCDD	< 0.967	pg/g		
	OctaCDF	< 0.200	pg/g		
	WHO(2005)-PCDD/F TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCDD/F TEQ (upper-bound)	0.172	pg/g		
☆ GFL07	polychlorinated biphenyls (12 WHO PCB + 6 ICES PCB) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	PCB 101	< 0.167	ng/g		
	PCB 105	< 6.50	pg/g		
	PCB 114	< 0.883	pg/g		
	PCB 118	< 23.3	pg/g		
	PCB 123	< 0.667	pg/g		
	PCB 126	< 0.417	pg/g		
	PCB 138	< 0.167	ng/g		
	PCB 153	< 0.167	ng/g		
	PCB 156	< 3.67	pg/g		
	PCB 157	< 0.683	pg/g		
	PCB 167	< 1.83	pg/g		
	PCB 169	< 2.00	pg/g		
	PCB 180	< 0.167	ng/g		
	PCB 189	< 0.667	pg/g		
	PCB 28	< 0.167	ng/g		
	PCB 52	< 0.167	ng/g		
	PCB 77	< 16.7	pg/g		
	PCB 81	< 0.450	pg/g		
	Total 6 ndl-PCB (lower-bound)	Not Detected	ng/g		
	Total 6 ndl-PCB (upper-bound)	1.0	ng/g		
	WHO(2005)-PCB TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCB TEQ (upper-bound)	0.105	pg/g		
☆ GFTE1	TEQ-Totals WHO-PCDD/F and PCB Method: Internal method, Calculation				
	WHO(2005)-PCDD/F+PCB TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCDD/F+PCB TEQ (upper-bound)	0.277	pg/g		
☆ J1054	Sulphur (S) Method: DIN EN ISO 11885, mod.				
	Sulphur total (S)	2.0	mg/kg	2	
☆ J1056	Silicon (Si) Method: DIN EN ISO 11885, mod.				
	Silicon (Si)	130	mg/kg	2	
☆ J5003	Aflatoxin M1 (milk products) Method: Internal method, IAC-LC-FLD				
	Aflatoxin M1	<0.01	µg/kg	0.01	
☆ JCSRA	Solvent residues (big scope) Method: Internal method, HS-GC-MS				
	1,1,1,2-Tetrachloroethane	<0.01	mg/kg	0.01	
	1,1,1-Trichloroethane	<0.01	mg/kg	0.01	
	1,1,2-Trichloroethane	<0.01	mg/kg	0.01	
	1,1-Dichloroethane	<0.05	mg/kg	0.05	
	1,2-Dichloroethane	<0.05	mg/kg	0.05	
	2-Butanon (Methylethylketon)	<1	mg/kg	1	
	2-Methylpentane	<1	mg/kg	1	
	3-Methylpentane	<1	mg/kg	1	
	Benzene	<0.01	mg/kg	0.01	
	Bromodichloromethane	<0.05	mg/kg	0.05	
	Chloroform (trichloromethane)	<0.01	mg/kg	0.01	

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		Results	Unit	LOQ	LOD
☆ JCSRA	Solvent residues (big scope) Method: Internal method, HS-GC-MS				
	cis-Dichloroethene	<0.05	mg/kg	0.05	
	Dibromochloromethane	<0.05	mg/kg	0.05	
	Dichloromethane	<0.05	mg/kg	0.05	
	Ethyl Acetate	<1	mg/kg	1	
	Ethylbenzene	<0.01	mg/kg	0.01	
	m-/-p-Xylene	<0.01	mg/kg	0.01	
	Methylcyclopentane	<1	mg/kg	1	
	n-Heptane	<1	mg/kg	1	
	n-Hexane	<1	mg/kg	1	
	n-Pentane	<1	mg/kg	1	
	Styrene	<0.01	mg/kg	0.01	
	Sum 3 chlorinated solvents	Inapplicable	mg/kg		
	Technical Hexane (calculated)	Inapplicable	mg/kg		
	Tetrachloroethene	<0.01	mg/kg	0.01	
	Tetrachloromethane	<0.01	mg/kg	0.01	
	Toluene	<0.01	mg/kg	0.01	
	trans-Dichloroethene	<0.05	mg/kg	0.05	
	Tribromomethane	<0.05	mg/kg	0.05	
	Trichloroethene	<0.01	mg/kg	0.01	
	Xylene (ortho-)	<0.01	mg/kg	0.01	
☆ JJ04T	Phthalate + DEHA Method: Internal method, GC-MS				
	Acetyltributylcitrat (ATBC)	<1	mg/kg	1	
	Benzyl butyl phthalate (BBP)	<1	mg/kg	1	
	Dibutyl phthalate (DBP)	<0.3	mg/kg		0.3
	Diethyl hexyl phthalate (DEHP)	<1	mg/kg	1	
	Diethyl phthalate (DEP)	<1	mg/kg	1	
	Diethylhexyl adipate (DEHA)	<1	mg/kg	1	
	Di-isobutyl phthalate (DiBP)	<0.3	mg/kg		0.3
	Diisodecylphthalate (DIDP)	<5	mg/kg	5	
	Diisononylphthalate (DINP)	<5	mg/kg	5	
	Dimethyl phthalate (DMP)	<1	mg/kg	1	
	DINCH	<5	mg/kg	5	
	Dioctyl phthalate (D-n-OP)	<1	mg/kg	1	
	Triisobutyl phosphate	<1	mg/kg	1	
☆ JJ088	Fumonisine B1, B2, B3 (maize and products derived from maize) Method: Internal Method, LC-MS/MS				
	Fumonisin B1 (FB1)	<20	µg/kg	20	
	Fumonisin B2 (FB2)	<20	µg/kg	20	
	Fumonisin B3 (FB3)	<20	µg/kg	20	
	Fumonisin sum (B1+B2)	<40	µg/kg	40	
	Fumonisin sum (B1+B2+B3)	<60	µg/kg		
☆ JJ0EW	Aflatoxin B1, B2, G1, G2 (spices, special matrix) Method: internal method based on EN 14123				
	Aflatoxin B1	<1	µg/kg	1	
	Aflatoxin B2	<1	µg/kg	1	
	Aflatoxin G1	<1	µg/kg	1	
	Aflatoxin G2	<1	µg/kg	1	
	Sum of all positive Aflatoxins	<4	µg/kg		
☆ JJ0FE	Fusarium toxins (DON, ZON, T2, HT2) Method: Internal method, LC-MS/MS				
	Deoxynivalenol (Vomitoxin)	<20	µg/kg	20	
	HT-2 Toxin	<10	µg/kg	10	
	sum T-2 HT-2 toxin	<20	µg/kg	20	
	T-2 Toxin	<10	µg/kg	10	
	Zearalenone (ZON)	<10	µg/kg	10	
☆ JJ0G5	Ochratoxin A (spices, special matrix) Method: internal method based on EN 14132, IAC-LC-FLD				

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		Results	Unit	LOQ	LOD
☆ JJ0G5	Ochratoxin A (spices, special matrix) Method: Internal method based on EN 14132, IAC-LC-FLD				
	Ochratoxin A (OTA)	<2	µg/kg	2	
☆ JJW2Z	Sterigmatocystin Method: Internal method, LC-MS/MS				
	Sterigmatocystin	<10	µg/kg	10	
☆ QA049	Polynuclear Aromatic Hydrocarbons (GC-MS) Method: Internal method, GC-MS				
	Acenaphthene	<1.0	µg/kg	1	
	Acenaphthylene	<2.0	µg/kg	2	
	Anthracene	<2.0	µg/kg	2	
	Benzo(a)anthracene	<0.50	µg/kg	0.5	
	Benzo(a)pyrene	<0.50	µg/kg	0.5	
	Benzo-(b)-Fluoranthene	<0.50	µg/kg	0.5	
	Benzo(ghi)perylene	<2.0	µg/kg	2	
	Benzo(k)fluoranthene	<3.0	µg/kg	3	
	Chrysene	<0.50	µg/kg	0.5	
	Dibenzo(a,h)anthracene	<3.0	µg/kg	3	
	Fluoranthene	<1.0	µg/kg	1	
	Fluorene	<2.0	µg/kg	2	
	Indeno(1,2,3-cd)pyrene	<2.0	µg/kg	2	
	Naphthalene	<20	µg/kg	20	
	Phenanthrene	<2.0	µg/kg	2	
	Pyrene	<1.0	µg/kg	1	
☆ QA156	Fatty Acid Profile Method: AOAC 996.06				
	C 6:0 (Caproic acid)	<0.020	g/100 g	0.02	
	C 8:0 (Caprylic acid)	<0.020	g/100 g	0.02	
	C 10:0 (Capric acid)	<0.020	g/100 g	0.02	
	C 12:0 (Lauric acid)	<0.020	g/100 g	0.02	
	C 14:0 (Myristic acid)	0.386	g/100 g	0.02	
	C 14:1 (Myristoleic acid)	<0.020	g/100 g	0.02	
	C 15:0 (Pentadecanoic acid)	<0.020	g/100 g	0.02	
	C 15:1 (Pentadecenoic acid)	<0.020	g/100 g	0.02	
	C 16:0 (Palmitic acid)	7.257	g/100 g	0.02	
	C 16:1 (Palmitoleic acid)	0.121	g/100 g	0.02	
	C 17:0 (Margaric acid)	0.243	g/100 g	0.02	
	C 17:1 (Heptadecenoic acid)	0.098	g/100 g	0.02	
	C 18:0 (Stearic acid)	6.721	g/100 g	0.02	
	C 18:1 (Oleic acid)	5.916	g/100 g	0.02	
	C 18:1n7 (Vaccenic acid)	0.295	g/100 g	0.02	
	C 18:2n6 (Linoleic acid)	6.009	g/100 g	0.02	
	C 18:3n3 (alpha-Linolenic Acid)	0.073	g/100 g	0.02	
	C 18:3n6 (gamma-Linolenic Acid)	2.450	g/100 g	0.02	
	C 20:0 (Arachidic acid)	0.873	g/100 g	0.02	
	C 20:1 (Eicosenoic acid)	0.430	g/100 g	0.02	
	C 20:2n6 (Eicosodienoic acid)	0.421	g/100 g	0.02	
	C 20:3n3 (Eicosatrienoic acid)	0.229	g/100 g	0.02	
	C 20:3n6 (homo-gamma-Linolenic acid)	4.781	g/100 g	0.02	
	C 20:4n6 (Aracihdonic Acid)	43.914	g/100 g	0.02	
	C 20:5n3 (Eicosapentaenoic acid)	0.100	g/100 g	0.02	
	C 21:0 (Heneicosanoic acid)	0.063	g/100 g	0.02	
	C 22:0 (Behenic acid)	3.415	g/100 g	0.02	
	C 22:1n9 (Erucic acid)	0.114	g/100 g	0.02	
	C 22:2n6 (Docosadienoic acid)	<0.020	g/100 g	0.02	
	C 22:6n3 (Docosahexaenoic acid)	<0.020	g/100 g	0.02	
	C 22-5n3 (Docosapentaenoic acid)	<0.020	g/100 g	0.02	

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		Results	Unit	LOQ	LOD
☆ QA156	Fatty Acid Profile Method: AOAC 996.06				
	C 22-5n6 (Docosapentaenoic acid)	<0.020	g/100 g	0.02	
	C 23:0 (Tricosanoic acid)	<0.020	g/100 g	0.02	
	C 24:0 (Lignoceric acid)	11.381	g/100 g	0.02	
	C 24:1 (Nervonic acid)	0.372	g/100 g	0.02	
	Monounsaturated Fat	7.425	g/100 g	0.02	
	Omega-3 fatty acids	0.400	g/100 g	0.02	
	Omega-6 fatty acids	57.575	g/100 g	0.02	
	Polyunsaturated Fat	57.975	g/100 g	0.02	
	Saturated Fat	30.340	g/100 g	0.02	
	Total Fat	95.75	g/100 g	0.02	
☆ QA307	Glyceride Profile Method: AOCS Cd 11c-93				
	Diglycerides	4.59	%	1	
	Glycerol	<1.00	%	1	
	Monoglycerides	1.14	%	1	
	Triglycerides	93.28	%	1	
☆ QA934	Trans Fatty Acids, relative area% (GC-FID) Method: AOCS 2a-94				
	Total Trans Fatty Acids	0.24	%	0.05	
☆ QD106	Iodine Value Method: AOCS Cd 1d-92				
	Iodine value	183.5			
☆ S1102	Dithiocarbamates Method: EN 12396-3:2000				
	Dithiocarbamates (as CS2)	< 0.1	mg/kg	0.1	
☆ SF7DN	Fipronil Method: Internal method, GC-MS				
	Fipronil	<0.04	mg/kg	0.04	
☆ SF7K0	Fipronil, desulfinyl- Method: Internal method, GC-MS				
	Fipronil, desulfinyl-	<0.04	mg/kg	0.04	
☆ SP421	Organochlorine Pesticides, Pyrethroides Method: ASU L00.00-34				
	Screened pesticides	Not Detected			
☆ SP424	Organophosphorus Pesticides Method: ASU L00.00-34				
	Screened pesticides	Not Detected			
☆ SPGZ5	Organotin Pesticides Method: Internal method, GC-MS				
	Cyhexatin/Azocyclotin (Sum)	Inapplicable	mg/kg		
☆ SU007	Mercury (AAS) Method: BS EN 13806:2002				
	Mercury (Hg)	<0.005	mg/kg	0.005	
☆ SU04N	Sodium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Sodium (Na)	<1	mg/100 g	1	
☆ SU051	Manganese (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Manganese (Mn)	<0.1	mg/kg	0.1	
☆ SU055	Molybdenum (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Molybdenum (Mo)	<0.1	mg/kg	0.1	
☆ SU056	Nickel (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Nickel (Ni)	<0.1	mg/kg	0.1	
☆ SU05D	Lead (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Lead (Pb)	<0.05	mg/kg	0.05	
☆ SU05E	Arsenic (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Arsenic (As)	<0.1	mg/kg	0.1	
☆ SU05F	Chromium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Chromium (Cr)	<0.1	mg/kg	0.1	
☆ SU05G	Cadmium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Cadmium (Cd)	<0.01	mg/kg	0.01	
☆ SU05H	Iron (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Iron (Fe)	<0.1	mg/kg	0.1	
☆ SU05J	Copper (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Copper (Cu)	0.80	mg/kg	0.1	
☆ SU05K	Phosphorus (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				

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		Results	Unit	LOQ	LOD
☆ SU05K	Phosphorus (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Phosphorus (P)	41.6	mg/kg	5	
☆ SU20L	Protein Method: AOAC 984.13				
	Protein	<0.1 (k=6.25)	g/100 g	0.1	
☆ SU20Q	Dietary fiber Method: AOAC 991.43				
	Dietary fiber	<0.5	g/100 g	0.5	
☆ SU20U	Total fat Method: AOAC 963.15				
	Total fat	99.9	g/100 g	0.1	
☆ SU20Y	Moisture (Direct drying method) Method: AOAC 935.29				
	Moisture	0.12	g/100 g	0.01	
☆ SU21B	Energy				
	Energy kcal (calculated)	899	kcal/100 g		
	Energy kJ (calculated)	3696	kJ/100 g		
☆ SU21C	Carbohydrates				
	Carbohydrates (available)	<0.1	g/100 g	0.1	
	Total carbohydrates	<0.1	g/100 g	0.1	
☆ SU21J	Moisture and Volatile matter Method: ISO 662:1998				
	moisture and volatile matter content	0.03	g/100 g	0.01	
☆ SU21L	Sugar Profile Method: AOAC 995.13, modified				
	Fructose	<0.1	g/100 g	0.1	
	Galactose	<0.1	g/100 g	0.1	
	Glucose	<0.1	g/100 g	0.1	
	Lactose	<0.1	g/100 g	0.1	
	Maltose	<0.1	g/100 g	0.1	
	Monosaccharides and Disaccharides	<0.1	g/100 g	0.1	
	Sucrose	<0.1	g/100 g	0.1	
☆ SU227	Ash Method: AOAC 941.12				
	Ash	<0.1	g/100 g	0.01	
• SU9QW	Butane residual Method: Internal method, Internal Method GC-MS				
	Butane	Not Detected	mg/kg	1	
VV00B	Coliforms Method: ISO 4832:2006				
	Coliforms	<1	cfu/ml		
VV00D	Yeasts and moulds Method: ISO 21527:2008				
	Moulds	<1	cfu/ml		
	Yeast	<1	cfu/ml		
VV00E	Salmonella Method: ISO 6579:2002				
	Salmonella	Not Detected	/25 g		
VV00G	Bacillus cereus Method: ISO 7932:2004				
	Bacillus cereus	<1	cfu/ml		
VV00P	Aerobic plate count Method: ISO 4833-1:2013				
	Aerobic plate count	<1	cfu/ml		
VV00V	Enterobacter sakazakii Method: ISO/TS 22964:2006				
	Cronobacter spp	Not Detected	/25 g		
VV0A2	Listeria monocytogenes Method: ISO 11290-1:1996/Amd.1:2004				
	Listeria monocytogenes	Not Detected	/25 g		
VV0A3	Coagulase-positive staphylococci Method: ISO 6888-1:1999/AMD 1:2003				
	Coagulase-positive staphylococci	<1	cfu/ml		
VV0A4	Escherichia coli Method: ISO 16649-2:2001				
	Escherichia coli	<1	cfu/ml		

List of screened and not detected molecules (* = limit of quantification)

SP421 **Organochlorine Pesticides, Pyrethroides** (LOQ* mg/kg)

2,3,4,6-Tetrachloroanisol (0.005)	Aclonifen (0.01)	Acrinathrin (0.05)	Aldrin (0.005)	Aldrin/ Dieldrin (Sum) ()	Benfluralin (0.005)
Benzoylprop-ethyl (0.01)	Bifenox (0.02)	Binapacryl (0.02)	Bifenthrin (0.05)	Bromocyclen (0.01)	Bromoxynil-octanoate (0.01)
Butralin (0.02)	Chlordane (total) ()	Chlordane, cis- (0.005)	Chlordane, oxy- (0.005)	Chlordane, trans- (0.005)	Chlorfenapyr (0.01)
Chlorfenprop-methyl (0.02)	Chlorfenson (0.01)	Chloroneb (0.02)	Chlorothalonil (0.01)	Chlorthal-dimethyl (0.005)	Cyfluthrin (0.05)
Cyhalothrin, lambda- (0.05)	Cypermethrin (0.05)	Cyphenothrin (0.05)	DDD, o,p- (0.005)	DDD, p,p'- (0.005)	DDE, o,p- (0.005)

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SP421 Organochlorine Pesticides, Pyrethroides (LOQ* mg/kg)

DDE, p,p'- (0.005)	DDT (total) ()	DDT, o,p'- (0.005)	DDT, p,p'- (0.005)	Deltamethrin (0.05)	Dibromobenzophenone, p,p- (0.02)
Dichlobenil (0.01)	Dichlone (0.02)	Dicloran (0.005)	Dichlorobenzophenone, o,p- (0.02)	Dichlorobenzophenone, p,p- (0.02)	Dicofol (sum) ()
Dicofol, o,p- (0.02)	Dicofol, p,p- (0.02)	Dieldrin (0.005)	Dienochlor (0.01)	Dinitramine (0.01)	Dinobuton (0.02)
Endosulfan (total) ()	Endosulfan, alpha- (0.005)	Endosulfan sulphate (0.01)	Endosulfan, beta- (0.005)	Endrin (0.005)	Endrin ketone (0.01)
Ethalfluralin (0.01)	Etridiazole (0.01)	Fenfluthrin (0.05)	Fenpropathrin (0.05)	Fenson (0.01)	Fenvalerate (RR-/SS-isomers) (0.05)
Fenvalerate (RS-/SR-isomers) (0.05)	Flubenzimine (0.01)	Fluchloralin (0.01)	Flucythrinate (0.05)	Flumetralin (0.01)	Fluorodifen (0.01)
Fluoroimide (0.02)	Genite (0.01)	Halfenprox (0.05)	HCH isomers (without lindane) ()	HCH, alpha- (0.005)	HCH, beta- (0.005)
HCH, delta- (0.005)	HCH, epsilon- (0.005)	Lindane (gamma-HCH) (0.005)	Heptachlor (0.005)	Heptachlor (sum) ()	Heptachlor epoxide, cis- (0.005)
Heptachlor epoxide, trans- (0.005)	Hexachlorobenzene (HCB) (0.005)	Ioxynil-octanoate (0.01)	Isobenzan (0.005)	Isodrin (0.005)	Isopropalin (0.01)
Methoxychlor (0.01)	Mirex (0.005)	Nitrapyrin (0.01)	Nitrofen (0.01)	Nonachlor, trans- (0.005)	Octachlorostyrene (0.005)
Oxyfluorfen (0.01)	Pendimethalin (0.01)	Pentachloroanisole (0.005)	Pentachloroaniline (0.005)	Pentachlorobenzene (0.01)	Pentachlorothioanisole (0.005)
Permethrin (0.05)	Pilfenate (0.02)	Polychloroterpene (Camphechlor) (0.5)	Profluralin (0.005)	Quintozene (0.005)	Quintozene (sum) ()
S 421 (0.01)	tau-Fluvalinate (0.05)	Tecnazene (0.005)	Tefluthrin (0.05)	Tetradifon (0.01)	Tetrasul (0.01)
Tralomethrin (0.05)	Transfluthrin (0.05)	Trialiate (0.02)	Trichloronat (0.01)	Trifluralin (0.005)	

SP424 Organophosphorus Pesticides (LOQ* mg/kg)

Acephate (0.02)	Azinphos-ethyl (0.05)	Azinphos-methyl (0.05)	Bromfenvinphos (0.02)	Bromophos-methyl (0.02)	Bromophos-ethyl (0.02)
Butamifos (0.02)	Cadusaphos (0.02)	Carbophenothion (0.02)	Carbophenothion-methyl (0.02)	Chlorfenvinphos (0.02)	Chlormephos (0.02)
Chlorpyrifos (-ethyl) (0.02)	Chlorpyrifos-methyl (0.02)	Chlorthion (0.02)	Chlorthiophos (0.02)	Coumaphos (0.1)	Crotoxyphos (0.02)
Crufomate (0.02)	Cyanofenphos (0.05)	Cyanophos (0.02)	Demeton-S-methyl (0.05)	Demeton-S-methyl-sulfone (0.1)	Dialifos (0.02)
Diazinon (0.02)	Dicapthon (0.02)	Dichlofenthion (0.02)	Dichlorvos (0.02)	Dicrotophos (0.02)	Dimefox (0.02)
Dimethoate (0.02)	Dimethylvinphos (0.02)	Dioxabenzofos (0.02)	Dioxathion (0.05)	Disulfoton (0.05)	Disulfoton-sulfon (0.05)
Disulfoton-sulfoxide (0.05)	Ditalimfos (0.02)	Edifenphos (0.05)	Ethion (0.02)	Ethoprophos (0.02)	Etrimfos (0.02)
Fenamiphos (0.02)	Fenamiphos-sulfone (0.05)	Fenamiphos-sulfoxide (0.05)	Fenchlorphos (0.02)	Fenchlorphos oxon (0.05)	Fenitrothion (0.02)
Fensulfothion (0.02)	Fensulfothion-oxon-sulfone (0.05)	Fensulfothion-oxon-sulfoxide (0.05)	Fensulfothion-sulfone (0.05)	Fenthion (0.02)	Fenthion-oxon-sulfone (0.05)
Fenthion-oxon-sulfoxide (0.05)	Fenthion-sulfone (0.05)	Fenthion-sulfoxide (0.05)	Fonofos (0.02)	Formothion (0.02)	Fosthiazate (0.05)
Fosthietan (0.02)	Heptenophos (0.02)	Iodofenphos (0.05)	Iprobenfos (0.02)	Isazophos (0.02)	Isocarbofos (0.02)
Isofenphos (0.02)	Isofenphos-methyl (0.02)	Isoxathion (0.05)	Leptophos (0.05)	Mateoxon (0.02)	Malathion (0.02)
Mecarbam (0.02)	Mephosfolan (0.02)	Merphos (0.05)	Methacrifos (0.02)	Methamidophos (0.02)	Methidathion (0.02)
Mevinphos (0.02)	Monocrotophos (0.02)	Morphothion (0.05)	Omethoate (0.02)	Oxydemeton-methyl (0.1)	Paraoxon-ethyl (0.02)
Paraoxon-methyl (0.02)	Parathion (0.02)	Parathion-methyl (0.02)	Phenkapton (0.05)	Phenthoate (0.02)	Phorate (0.02)
Phorate-sulfone (0.05)	Phorate-sulfoxide (0.05)	Phosalone (0.05)	Phosmet (0.05)	Phosphamidon (0.02)	Pirimiphos-ethyl (0.02)
Pirimiphos-methyl (0.02)	Profenofos (0.02)	Propaphos (0.02)	Propetamphos (0.02)	Prothiofos (0.02)	Prothoate (0.02)
Pyraclofos (0.05)	Pyrazophos (0.05)	Pyridaphenthion (0.02)	Quinalphos (0.02)	Quintiofos (0.02)	Sulfotep (0.02)
Sulprofos (0.05)	TEPP (0.02)	Terbufos (0.02)	Terbufos-sulfone (0.05)	Tetrachlorvinphos (0.02)	Thiometon (0.02)
Tolclofos-methyl (0.02)	Triamiphos (0.05)	Triazophos (0.02)	Trichlorfon (0.1)	Vamidothion (0.05)	

SIGNATURE (b) (6)

Kevin Fu
Authorized Signatory

EXPLANATORY NOTE

≥ Greater than or equal to
< Less than
≤ Less than or equal to
N/A means Not applicable

☆ means the test is subcontracted within Eurofins group
◦ means the test is subcontracted outside Eurofins group

END OF REPORT

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Analytical Report

Sample Code	128-2017-00005025	Report date	27-Jun-2017
Certificate No.	AR-17-VV-005479-01		

Linyi Youkang Biology Co., Ltd.

Racheal GAO
Lianbang Road,
Economical and Technical Development Area,
Linyi City, ShanDong Province

Our reference:	128-2017-00005025/ AR-17-VV-005479-01
Client Sample Code:	A2017031001
Sample described as:	ARACHIDONIC ACID OIL
Sample Packaging:	Sealed metal bottle
Sample reception date:	02-Jun-2017
Analysis starting date:	02-Jun-2017
Analysis ending date:	27-Jun-2017
Arrival Temperature (°C)	-16.6
Sample Weight	3kg

		Results	Unit	LOQ	LOD
☆ A7165	Patulin (solid/dry samples) Method: Internal method, LC-MS/MS				
	Patulin	<20	µg/kg	20	
☆ AS403	Haloxyfop Method: Internal method, GC-MS				
	Haloxyfop (total, after hydrolysis)	< 0.003	mg/kg	0.003	
☆ DJPFG	Vitamin E profile in Margarine, Butter, Fats & Oils. Tocopherole profile Method: EN 12822:2014				
	alpha-Tocopherol (vitamin E)	97.1	mg/100 g	0.5	
	beta-Tocopherol (vitamin E)	<0.5	mg/100 g	0.5	
	delta-Tocopherol (vitamin E)	<0.5	mg/100 g	0.5	
	gamma-Tocopherol (vitamin E)	<0.5	mg/100 g	0.5	
	sum tocopherols	97.1	mg/100 g		
☆ DJTTG	Tocotrienols in fats and oils Method: ISO 9936:2006				
	alpha-Tocotrienol	0.481	mg/100 g	0.08	
	beta-Tocotrienol	<0.5	mg/100 g	0.5	
	delta-Tocotrienol	<0.5	mg/100 g	0.5	
	gamma-Tocotrienol	<0.5	mg/100 g	0.5	
	Tocotrienols Total	0.481	mg/100 g		
☆ GFL01	Dioxins and Furans (17 PCDD/F) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	1,2,3,4,6,7,8-HeptaCDD	< 0.131	pg/g		
	1,2,3,4,6,7,8-HeptaCDF	< 0.0917	pg/g		
	1,2,3,4,7,8,9-HeptaCDF	< 0.0638	pg/g		
	1,2,3,4,7,8-HexaCDD	< 0.0622	pg/g		
	1,2,3,4,7,8-HexaCDF	< 0.0966	pg/g		
	1,2,3,6,7,8-HexaCDD	< 0.0851	pg/g		
	1,2,3,6,7,8-HexaCDF	< 0.0884	pg/g		
	1,2,3,7,8,9-HexaCDD	< 0.0802	pg/g		
	1,2,3,7,8,9-HexaCDF	< 0.0655	pg/g		
	1,2,3,7,8-PentaCDD	< 0.0409	pg/g		
	1,2,3,7,8-PentaCDF	< 0.0589	pg/g		
	2,3,4,6,7,8-HexaCDF	< 0.0802	pg/g		
	2,3,4,7,8-PentaCDF	< 0.0917	pg/g		
	2,3,7,8-TetraCDD	< 0.0311	pg/g		

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		Results	Unit	LOQ	LOD
☆ GFL01	Dioxins and Furans (17 PCDD/F) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	2,3,7,8-TetraCDF	< 0.0851	pg/g		
	OctaCDD	< 0.949	pg/g		
	OctaCDF	< 0.196	pg/g		
	WHO(2005)-PCDD/F TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCDD/F TEQ (upper-bound)	0.169	pg/g		
☆ GFL07	polychlorinated biphenyls (12 WHO PCB + 6 ICES PCB) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	PCB 101	< 0.164	ng/g		
	PCB 105	< 6.38	pg/g		
	PCB 114	< 0.867	pg/g		
	PCB 118	< 22.9	pg/g		
	PCB 123	< 0.655	pg/g		
	PCB 126	< 0.409	pg/g		
	PCB 138	< 0.164	ng/g		
	PCB 153	< 0.164	ng/g		
	PCB 156	< 3.60	pg/g		
	PCB 157	< 0.671	pg/g		
	PCB 167	< 1.80	pg/g		
	PCB 169	< 1.96	pg/g		
	PCB 180	< 0.164	ng/g		
	PCB 189	< 0.655	pg/g		
	PCB 28	< 0.164	ng/g		
	PCB 52	< 0.164	ng/g		
	PCB 77	< 16.4	pg/g		
	PCB 81	< 0.442	pg/g		
	Total 6 ndl-PCB (lower-bound)	Not Detected	ng/g		
	Total 6 ndl-PCB (upper-bound)	0.982	ng/g		
	WHO(2005)-PCB TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCB TEQ (upper-bound)	0.103	pg/g		
☆ GFTE1	TEQ-Totals WHO-PCDD/F and PCB Method: Internal method, Calculation				
	WHO(2005)-PCDD/F+PCB TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCDD/F+PCB TEQ (upper-bound)	0.272	pg/g		
☆ J1054	Sulphur (S) Method: DIN EN ISO 11885, mod.				
	Sulphur total (S)	32	mg/kg	2	
☆ J1056	Silicon (Si) Method: DIN EN ISO 11885, mod.				
	Silicon (Si)	160	mg/kg	2	
☆ J5003	Aflatoxin M1 (milk products) Method: Internal method, IAC-LC-FLD				
	Aflatoxin M1	<0.01	µg/kg	0.01	
☆ JCSRA	Solvent residues (big scope) Method: Internal method, HS-GC-MS				
	1,1,1,2-Tetrachloroethane	<0.01	mg/kg	0.01	
	1,1,1-Trichloroethane	<0.01	mg/kg	0.01	
	1,1,2-Trichloroethane	<0.01	mg/kg	0.01	
	1,1-Dichloroethane	<0.05	mg/kg	0.05	
	1,2-Dichloroethane	<0.05	mg/kg	0.05	
	2-Butanon (Methylethylketon)	<1	mg/kg	1	
	2-Methylpentane	<1	mg/kg	1	
	3-Methylpentane	<1	mg/kg	1	
	Benzene	<0.01	mg/kg	0.01	
	Bromodichloromethane	<0.05	mg/kg	0.05	
	Chloroform (trichloromethane)	<0.01	mg/kg	0.01	

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		Results	Unit	LOQ	LOD
☆ JCSRA	Solvent residues (big scope) Method: Internal method, HS-GC-MS				
	cis-Dichloroethene	<0.05	mg/kg	0.05	
	Dibromochloromethane	<0.05	mg/kg	0.05	
	Dichloromethane	<0.05	mg/kg	0.05	
	Ethyl Acetate	<1	mg/kg	1	
	Ethylbenzene	<0.01	mg/kg	0.01	
	m-/-p-Xylene	<0.01	mg/kg	0.01	
	Methylcyclopentane	<1	mg/kg	1	
	n-Heptane	<1	mg/kg	1	
	n-Hexane	<1	mg/kg	1	
	n-Pentane	<1	mg/kg	1	
	Styrene	<0.01	mg/kg	0.01	
	Sum 3 chlorinated solvents	Inapplicable	mg/kg		
	Technical Hexane (calculated)	Inapplicable	mg/kg		
	Tetrachloroethene	<0.01	mg/kg	0.01	
	Tetrachloromethane	<0.01	mg/kg	0.01	
	Toluene	<0.01	mg/kg	0.01	
	trans-Dichloroethene	<0.05	mg/kg	0.05	
	Tribromomethane	<0.05	mg/kg	0.05	
	Trichloroethene	<0.01	mg/kg	0.01	
	Xylene (ortho-)	<0.01	mg/kg	0.01	
☆ JJ04T	Phthalate + DEHA Method: Internal method, GC-MS				
	Acetyltributylcitrat (ATBC)	<1	mg/kg	1	
	Benzyl butyl phthalate (BBP)	<1	mg/kg	1	
	Dibutyl phthalate (DBP)	<0.3	mg/kg		0.3
	Diethyl hexyl phthalate (DEHP)	<1	mg/kg	1	
	Diethyl phthalate (DEP)	<1	mg/kg	1	
	Diethylhexyl adipate (DEHA)	<1	mg/kg	1	
	Di-isobutyl phthalate (DiBP)	<0.3	mg/kg		0.3
	Diisodecylphthalate (DIDP)	<5	mg/kg	5	
	Diisononylphthalate (DINP)	<5	mg/kg	5	
	Dimethyl phthalate (DMP)	<1	mg/kg	1	
	DINCH	<5	mg/kg	5	
	Dioctyl phthalate (D-n-OP)	<1	mg/kg	1	
	Triisobutyl phosphate	<1	mg/kg	1	
☆ JJ088	Fumonisine B1, B2, B3 (maize and products derived from maize) Method: Internal Method, LC-MS/MS				
	Fumonisin B1 (FB1)	<20	µg/kg	20	
	Fumonisin B2 (FB2)	<20	µg/kg	20	
	Fumonisin B3 (FB3)	<20	µg/kg	20	
	Fumonisin sum (B1+B2)	<40	µg/kg	40	
	Fumonisin sum (B1+B2+B3)	<60	µg/kg		
☆ JJ0EW	Aflatoxin B1, B2, G1, G2 (spices, special matrix) Method: internal method based on EN 14123				
	Aflatoxin B1	<1	µg/kg	1	
	Aflatoxin B2	<1	µg/kg	1	
	Aflatoxin G1	<1	µg/kg	1	
	Aflatoxin G2	<1	µg/kg	1	
	Sum of all positive Aflatoxins	<4	µg/kg		
☆ JJ0FE	Fusarium toxins (DON, ZON, T2, HT2) Method: Internal method, LC-MS/MS				
	Deoxynivalenol (Vomitoxin)	<20	µg/kg	20	
	HT-2 Toxin	<10	µg/kg	10	
	sum T-2 HT-2 toxin	<20	µg/kg	20	
	T-2 Toxin	<10	µg/kg	10	
	Zearalenone (ZON)	<10	µg/kg	10	
☆ JJ0G5	Ochratoxin A (spices, special matrix) Method: internal method based on EN 14132, IAC-LC-FLD				

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		Results	Unit	LOQ	LOD
☆ JJ0G5	Ochratoxin A (spices, special matrix) Method: internal method based on EN 14132, IAC-LC-FLD				
	Ochratoxin A (OTA)	<2	µg/kg	2	
☆ JJ0HV	Free fatty acids (FFA) Method: DGF C-V 2				
	Acid value (mg KOH/g)	<0.2	mg KOH/g	0.2	
	Free fatty acids (calculated as lauric acid)	<0.1	%	0.1	
	Free fatty acids (calculated as oleic acid)	<0.1	%	0.1	
	Free fatty acids (calculated as palmitic acid)	<0.1	%	0.1	
☆ JJW2Z	Sterigmatocystin Method: Internal method, LC-MS/MS				
	Sterigmatocystin	<10	µg/kg	10	
☆ JK07G	Unsaponifiable matter Method: ISO 18609				
	Unsaponifiable matter	0.8	%	0.1	
☆ QA049	Polynuclear Aromatic Hydrocarbons (GC-MS) Method: Internal method, GC-MS				
	Acenaphthene	<0.1	µg/kg	1	
	Acenaphthylene	<2.0	µg/kg	2	
	Anthracene	<2.0	µg/kg	2	
	Benzo(a)anthracene	<0.50	µg/kg	0.5	
	Benzo(a)pyrene	<0.50	µg/kg	0.5	
	Benzo-(b)-Fluoranthene	<0.50	µg/kg	0.5	
	Benzo(ghi)perylene	<2.0	µg/kg	2	
	Benzo(k)fluoranthene	<3.0	µg/kg	3	
	Chrysene	<0.5	µg/kg	0.5	
	Dibenzo(a,h)anthracene	<3.0	µg/kg	3	
	Fluoranthene	<1.0	µg/kg	1	
	Fluorene	<2.0	µg/kg	2	
	Indeno(1,2,3-cd)pyrene	<2.0	µg/kg	2	
	Naphthalene	<20	µg/kg	20	
	Phenanthrene	<2.0	µg/kg	2	
	Pyrene	<1.0	µg/kg	1	
☆ QA117	Anisidine Value (ISO Method) Method: ISO 6885				
	Anisidine Value	1.7		1	
☆ QA156	Fatty Acid Profile Method: AOAC 996.06				
	C 6:0 (Caproic acid)	<0.020	g/100 g	0.02	
	C 8:0 (Caprylic acid)	<0.020	g/100 g	0.02	
	C 10:0 (Capric acid)	<0.020	g/100 g	0.02	
	C 12:0 (Lauric acid)	<0.020	g/100 g	0.02	
	C 14:0 (Myristic acid)	0.386	g/100 g	0.02	
	C 14:1 (Myristoleic acid)	<0.020	g/100 g	0.02	
	C 15:0 (Pentadecanoic acid)	<0.020	g/100 g	0.02	
	C 15:1 (Pentadecenoic acid)	<0.020	g/100 g	0.02	
	C 16:0 (Palmitic acid)	7.236	g/100 g	0.02	
	C 16:1 (Palmitoleic acid)	0.120	g/100 g	0.02	
	C 17:0 (Margaric acid)	0.242	g/100 g	0.02	
	C 17:1 (Heptadecenoic acid)	0.067	g/100 g	0.02	
	C 18:0 (Stearic acid)	6.696	g/100 g	0.02	
	C 18:1 (Oleic acid)	5.891	g/100 g	0.02	
	C 18:1n7 (Vaccenic acid)	0.283	g/100 g	0.02	
	C 18:2n6 (Linoleic acid)	6.007	g/100 g	0.02	
	C 18:3n3 (alpha-Linolenic Acid)	0.072	g/100 g	0.02	
	C 18:3n6 (gamma-Linolenic Acid)	2.449	g/100 g	0.02	
	C 20:0 (Arachidic acid)	0.873	g/100 g	0.02	
	C 20:1 (Eicosenoic acid)	0.429	g/100 g	0.02	

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		Results	Unit	LOQ	LOD
☆ QA156	Fatty Acid Profile Method: AOAC 996.06				
	C 20:2n6 (Eicosodienoic acid)	0.417	g/100 g	0.02	
	C 20:3n3 (Eicosatrienoic acid)	0.229	g/100 g	0.02	
	C 20:3n6 (homo-gamma-Linolenic acid)	4.771	g/100 g	0.02	
	C 20:4n6 (Aracihdonic Acid)	43.780	g/100 g	0.02	
	C 20:5n3 (Eicosapentaenoic acid)	0.099	g/100 g	0.02	
	C 21:0 (Heneicosanoic acid)	0.067	g/100 g	0.02	
	C 22:0 (Behenic acid)	3.411	g/100 g	0.02	
	C 22:1n9 (Erucic acid)	0.114	g/100 g	0.02	
	C 22:2n6 (Docosadienoic acid)	<0.020	g/100 g	0.02	
	C 22:6n3 (Docosahexaenoic acid)	<0.020	g/100 g	0.02	
	C 22-5n3 (Docosapentaenoic acid)	<0.020	g/100 g	0.02	
	C 22-5n6 (Docosapentaenoic acid)	<0.020	g/100 g	0.02	
	C 23:0 (Tricosanoic acid)	<0.020	g/100 g	0.02	
	C 24:0 (Lignoceric acid)	11.346	g/100 g	0.02	
	C 24:1 (Nervonic acid)	0.371	g/100 g	0.02	
	Monounsaturated Fat	7.360	g/100 g	0.02	
	Omega-3 fatty acids	0.400	g/100 g	0.02	
	Omega-6 fatty acids	57.425	g/100 g	0.02	
	Polyunsaturated Fat	57.820	g/100 g	0.02	
	Saturated Fat	30.255	g/100 g	0.02	
	Total Fat	95.44	g/100 g	0.02	
☆ QA184	Arachidonic Acid (ARA) Method: AOCS Ce 1b-89				
	C 20:4n6 (Arachidonic acid)	419.8	mg/g	0.1	
☆ QA307	Glyceride Profile Method: AOCS Cd 11c-93				
	Diglycerides	4.39	%	1	
	Glycerol	<1.00	%	1	
	Monoglycerides	1.02	%	1	
	Triglycerides	93.29	%	1	
☆ QA934	Trans Fatty Acids, relative area% (GC-FID) Method: AOCS 2a-94				
	Total Trans Fatty Acids	0.25	%	0.05	
☆ QD04J	Lovibond Color - Lovibond Scale Method: AOCS Cc 13j-97, Cc 13e-92				
	Lovibond Color - Lovibond Scale	0.2R,1.1Y,0.0B,0.0N			
☆ QD106	Iodine Value Method: AOCS Cd 1d-92				
	Iodine value	185.7			
☆ S1102	Dithiocarbamates Method: EN 12396-3:2000				
	Dithiocarbamates (as CS2)	< 0.1	mg/kg	0.1	
☆ SF7DN	Fipronil Method: Internal method, GC-MS				
	Fipronil	<0.04	mg/kg	0.04	
☆ SF7K0	Fipronil, desulfinyl- Method: Internal method, GC-MS				
	Fipronil, desulfinyl-	<0.04	mg/kg	0.04	
☆ SP421	Organochlorine Pesticides, Pyrethroides Method: ASU L00.00-34				
	Screened pesticides	Not Detected			
☆ SP424	Organophosphorus Pesticides Method: ASU L00.00-34				
	Screened pesticides	Not Detected			
☆ SPGZ5	Organotin Pesticides Method: Internal method, GC-MS				
	Cyhexatin/Azocyclotin (Sum)	Inapplicable	mg/kg		
☆ SU007	Mercury (AAS) Method: BS EN 13806:2002				
	Mercury (Hg)	<0.005	mg/kg	0.005	
☆ SU04N	Sodium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Sodium (Na)	<1	mg/100 g	1	
☆ SU051	Manganese (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Manganese (Mn)	<0.1	mg/kg	0.1	

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		Results	Unit	LOQ	LOD
☆ SU055	Molybdenum (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Molybdenum (Mo)	<0.1	mg/kg	0.1	
☆ SU056	Nickel (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Nickel (Ni)	<0.1	mg/kg	0.1	
☆ SU05D	Lead (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Lead (Pb)	<0.05	mg/kg	0.05	
☆ SU05E	Arsenic (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Arsenic (As)	<0.1	mg/kg	0.1	
☆ SU05F	Chromium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Chromium (Cr)	<0.1	mg/kg	0.1	
☆ SU05G	Cadmium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Cadmium (Cd)	<0.01	mg/kg	0.01	
☆ SU05H	Iron (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Iron (Fe)	<0.1	mg/kg	0.1	
☆ SU05J	Copper (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Copper (Cu)	0.85	mg/kg	0.1	
☆ SU05K	Phosphorus (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Phosphorus (P)	44.4	mg/kg	5	
☆ SU207	Peroxide value Method: AOCS Cd 8b-90:2003				
	Peroxide value	<0.05	meq/kg	0.05	
☆ SU20L	Protein Method: AOAC 984.13				
	Protein	<0.1 (k=6.25)	g/100 g	0.1	
☆ SU20Q	Dietary fiber Method: AOAC 991.43				
	Dietary fiber	<0.5	g/100 g	0.5	
☆ SU20U	Total fat Method: AOAC 963.15				
	Total fat	100.0	g/100 g	0.1	
☆ SU20Y	Moisture (Direct drying method) Method: AOAC 935.29				
	Moisture	0.12	g/100 g	0.01	
☆ SU21B	Energy				
	Energy kcal (calculated)	900	kcal/100 g		
	Energy kJ (calculated)	3700	kJ/100 g		
☆ SU21C	Carbohydrates				
	Carbohydrates (available)	<0.1	g/100 g	0.1	
	Total carbohydrates	<0.1	g/100 g	0.1	
☆ SU21J	Moisture and Volatile matter Method: ISO 662:1998				
	moisture and volatile matter content	0.04	g/100 g	0.01	
☆ SU21L	Sugar Profile Method: AOAC 995.13, modified				
	Fructose	<0.1	g/100 g	0.1	
	Galactose	<0.1	g/100 g	0.1	
	Glucose	<0.1	g/100 g	0.1	
	Lactose	<0.1	g/100 g	0.1	
	Maltose	<0.1	g/100 g	0.1	
	Monosaccharides and Disaccharides	<0.1	g/100 g	0.1	
	Sucrose	<0.1	g/100 g	0.1	
☆ SU227	Ash Method: AOAC 941.12				
	Ash	<0.1	g/100 g	0.01	
• SU9QW	Butane residual Method: Internal method, Internal Method GC-MS				
	Butane	Not Detected	mg/kg	1	
VV00B	Coliforms Method: ISO 4832:2006				
	Coliforms	<1	cfu/ml		
VV00D	Yeasts and moulds Method: ISO 21527:2008				
	Moulds	<1	cfu/ml		
	Yeast	<1	cfu/ml		
VV00E	Salmonella Method: ISO 6579:2002				
	Salmonella	Not Detected	/25 g		

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		Results	Unit	LOQ	LOD
VV00G	Bacillus cereus Method: ISO 7932:2004				
	Bacillus cereus	<1	cfu/ml		
VV00P	Aerobic plate count Method: ISO 4833-1:2013				
	Aerobic plate count	<1	cfu/ml		
VV00V	Enterobacter sakazakii Method: ISO/TS 22964:2006				
	Cronobacter spp	Not Detected	/25 g		
VV0A2	Listeria monocytogenes Method: ISO 11290-1:1996/Amd.1:2004				
	Listeria monocytogenes	Not Detected	/25 g		
VV0A3	Coagulase-positive staphylococci Method: ISO 6888-1:1999/AMD 1:2003				
	Coagulase-positive staphylococci	<1	cfu/ml		
VV0A4	Escherichia coli Method: ISO 16649-2:2001				
	Escherichia coli	<1	cfu/ml		

List of screened and not detected molecules (* = limit of quantification)

SP421 Organochlorine Pesticides, Pyrethroides (LOQ* mg/kg)

2,3,4,6-Tetrachloranisol (0.005)	Aclonifen (0.01)	Acrinathrin (0.05)	Aldrin (0.005)	Aldrin/ Dieldrin (Sum) ()	Benfluralin (0.005)
Benzoylprop-ethyl (0.01)	Bifenox (0.02)	Binapacryl (0.02)	Bifenthrin (0.05)	Bromocyclen (0.01)	Bromoxynil-octanoate (0.01)
Butralin (0.02)	Chlordane (total) ()	Chlordane, cis- (0.005)	Chlordane, oxy- (0.005)	Chlordane, trans- (0.005)	Chlorfenapyr (0.01)
Chlorfenprop-methyl (0.02)	Chlorfenson (0.01)	Chloroneb (0.02)	Chlorothalonil (0.01)	Chlorthal-dimethyl (0.005)	Cyfluthrin (0.05)
Cyhalothrin, lambda- (0.05)	Cypermethrin (0.05)	Cyphenothrin (0.05)	DDD, o,p- (0.005)	DDD, p,p'- (0.005)	DDE, o,p- (0.005)
DDE, p,p'- (0.005)	DDT (total) ()	DDT, o,p'- (0.005)	DDT, p,p'- (0.005)	Deltamethrin (0.05)	Dibromobenzophenone, p,p- (0.02)
Dichlobenil (0.01)	Dichlone (0.02)	Dicloran (0.005)	Dichlorobenzophenone, o,p- (0.02)	Dichlorobenzophenone, p,p- (0.02)	Dicofol (sum) ()
Dicofol, o,p- (0.02)	Dicofol, p,p- (0.02)	Dieldrin (0.005)	Dienochlor (0.01)	Dinitramine (0.01)	Dinobuton (0.02)
Endosulfan (total) ()	Endosulfan, alpha- (0.005)	Endosulfan sulphate (0.01)	Endosulfan, beta- (0.005)	Endrin (0.005)	Endrin ketone (0.01)
Ethalfluralin (0.01)	Etridiazole (0.01)	Fenfluthrin (0.05)	Fenpropathrin (0.05)	Fenson (0.01)	Fenvalerate (RR-/SS-Isomers) (0.05)
Fenvalerate (RS-/SR-Isomers) (0.05)	Flubenzimine (0.01)	Fluchloralin (0.01)	Fluvalinate (0.05)	Flumetralin (0.01)	Fluorodifen (0.01)
Fluoroimide (0.02)	Genite (0.01)	Halfenprox (0.05)	HCH isomers (without lindane) ()	HCH, alpha- (0.005)	HCH, beta- (0.005)
HCH, delta- (0.005)	HCH, epsilon- (0.005)	Lindane (gamma-HCH) (0.005)	Heptachlor (0.005)	Heptachlor (sum) ()	Heptachlor epoxide, cis- (0.005)
Heptachlor epoxide, trans- (0.005)	Hexachlorobenzene (HCB) (0.005)	Ioxynil-octanoate (0.01)	Isobenzan (0.005)	Isodrin (0.005)	Isopropalin (0.01)
Methoxychlor (0.01)	Mirex (0.005)	Nitrapyrin (0.01)	Nitrofen (0.01)	Nonachlor, trans- (0.005)	Octachlorstyrene (0.005)
Oxyfluorfen (0.01)	Pendimethalin (0.01)	Pentachloranisole (0.005)	Pentachloroaniline (0.005)	Pentachlorobenzene (0.01)	Pentachlorothioanisole (0.005)
Permethrin (0.05)	Piflubate (0.02)	Polychloroterpene (Camphechlor) (0.5)	Profluralin (0.005)	Quintozene (0.005)	Quinlozene (sum) ()
S 421 (0.01)	tau-Fluvalinate (0.05)	Tecnazene (0.005)	Tefluthrin (0.05)	Tetradifon (0.01)	Tetrasul (0.01)
Tralomethrin (0.05)	Transfluthrin (0.05)	Trialate (0.02)	Trichloronat (0.01)	Trifluralin (0.005)	

SP424 Organophosphorus Pesticides (LOQ* mg/kg)

Acephate (0.02)	Azinphos-ethyl (0.05)	Azinphos-methyl (0.05)	Bromfenvinphos (0.02)	Bromophos-methyl (0.02)	Bromophos-ethyl (0.02)
Butamifos (0.02)	Cadusaphos (0.02)	Carbophenothion (0.02)	Carbophenothion-methyl (0.02)	Chlorfenvinphos (0.02)	Chlormephos (0.02)
Chlorpyrifos (-ethyl) (0.02)	Chlorpyrifos-methyl (0.02)	Chlorthion (0.02)	Chlorthiophos (0.02)	Coumaphos (0.1)	Crotoxyphos (0.02)
Crufomate (0.02)	Cyanofenphos (0.05)	Cyanophos (0.02)	Demeton-S-methyl (0.05)	Demeton-S-methyl-sulfone (0.1)	Dialifos (0.02)
Diazinon (0.02)	Dicapthon (0.02)	Dichlofenthion (0.02)	Dichlorvos (0.02)	Dicrotophos (0.02)	Dimefox (0.02)
Dimethoate (0.02)	Dimethylvinphos (0.02)	Dioxabenzofos (0.02)	Dioxathion (0.05)	Disulfoton (0.05)	Disulfoton-sulfon (0.05)
Disulfoton-sulfoxide (0.05)	Ditalimfos (0.02)	Edifenphos (0.05)	Ethion (0.02)	Ethoprophos (0.02)	Etrimfos (0.02)
Fenamiphos (0.02)	Fenamiphos-sulfone (0.05)	Fenamiphos-sulfoxide (0.05)	Fenchlorphos (0.02)	Fenchlorphos oxon (0.05)	Fenitrothion (0.02)
Fensulfothion (0.02)	Fensulfothion-oxon-sulfone (0.05)	Fensulfothion-oxon-sulfoxide (0.05)	Fensulfothion-sulfone (0.05)	Fenthion (0.02)	Fenthion-oxon-sulfone (0.05)
Fenthion-oxon-sulfoxide (0.05)	Fenthion-sulfone (0.05)	Fenthion-sulfoxide (0.05)	Fonofos (0.02)	Formothion (0.02)	Fosthiazate (0.05)
Fosthietan (0.02)	Heptenophos (0.02)	Iodofenphos (0.05)	Iprobenfos (0.02)	Isazophos (0.02)	Isocarbofos (0.02)
Isofenphos (0.02)	Isofenphos-methyl (0.02)	Isoxathion (0.05)	Leptophos (0.05)	Malaoxon (0.02)	Malathion (0.02)
Mecarbam (0.02)	Mephosfolan (0.02)	Merphos (0.05)	Methacrifos (0.02)	Methamidophos (0.02)	Methidathion (0.02)
Mevinphos (0.02)	Monocrotophos (0.02)	Morphothion (0.05)	Omethoate (0.02)	Oxydemeton-methyl (0.1)	Paraoxon-ethyl (0.02)
Paraoxon-methyl (0.02)	Parathion (0.02)	Parathion-methyl (0.02)	Phenkapton (0.05)	Phenthoate (0.02)	Phorate (0.02)
Phorate-sulfone (0.05)	Phorate-sulfoxide (0.05)	Phosalone (0.05)	Phosmet (0.05)	Phosphamidon (0.02)	Pirimiphos-ethyl (0.02)
Pirimiphos-methyl (0.02)	Profenofos (0.02)	Propaphos (0.02)	Propetamphos (0.02)	Prothiofos (0.02)	Prothoate (0.02)
Pyraclofos (0.05)	Pyrazophos (0.05)	Pyridaphenthion (0.02)	Quinalphos (0.02)	Quintiofos (0.02)	Sulfotep (0.02)
Sulprofos (0.05)	TEPP (0.02)	Terbufos (0.02)	Terbufos-sulfone (0.05)	Tetrachlorvinphos (0.02)	Thiometon (0.02)
Tolclofos-methyl (0.02)	Triamiphos (0.05)	Triazophos (0.02)	Trichlorfon (0.1)	Vamidothion (0.05)	

SIGNATURE

(b) (6)

Kevin Fu
Authorized Signatory

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EXPLANATORY NOTE

≥ Greater than or equal to

< Less than

≤ Less than or equal to

N/A means Not applicable

☆ means the test is subcontracted within Eurofins group

* means the test is subcontracted outside Eurofins group

For and on behalf of Eurofins Technology Service (Qingdao) Co., Ltd.

END OF REPORT

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Analytical Report

Sample Code	128-2017-00005026	Report date	30-Jun-2017
Certificate No.	AR-17-VV-005480-02		

*This report invalidates all previous versions.

Linyi Youkang Biology Co., Ltd.
Racheal GAO
Lianbang Road,
Economical and Technical Development Area,
Linyi City, ShanDong Province

Our reference:	128-2017-00005026/ AR-17-VV-005480-02
Client Sample Code:	A2017031701
Sample described as:	ARACHIDONIC ACID OIL
Sample Packaging:	Sealed metal bottle
Sample reception date:	02-Jun-2017
Analysis starting date:	02-Jun-2017
Analysis ending date:	30-Jun-2017
Arrival Temperature (°C)	-16.6
Sample Weight	3kg

		Results	Unit	LOQ	LOD
☆ A7165	Patulin (solid/dry samples) Method: Internal method, LC-MS/MS				
	Patulin	<20	µg/kg	20	
☆ AS403	Haloxyfop Method: Internal method, GC-MS				
	Haloxyfop (total, after hydrolysis)	< 0.003	mg/kg	0.003	
☆ DJPFG	Vitamin E profile in Margarine, Butter, Fats & Oils. Tocopherole profile Method: EN 12822:2014				
	alpha-Tocopherol (vitamin E)	97.8	mg/100 g	0.5	
	beta-Tocopherol (vitamin E)	<0.5 (LOQ)	mg/100 g	0.5	
	delta-Tocopherol (vitamin E)	<0.5 (LOQ)	mg/100 g	0.5	
	gamma-Tocopherol (vitamin E)	<0.5 (LOQ)	mg/100 g	0.5	
	sum tocopherols	97.8	mg/100 g		
☆ DJTTG	Tocotrienols in fats and oils Method: ISO 9936:2006				
	alpha-Tocotrienol	0.411	mg/100 g	0.08	
	beta-Tocotrienol	<0.5 (LOQ)	mg/100 g	0.5	
	delta-Tocotrienol	<0.5 (LOQ)	mg/100 g	0.5	
	gamma-Tocotrienol	<0.5 (LOQ)	mg/100 g	0.5	
	Tocotrienols Total	0.411	mg/100 g		
☆ GFL01	Dioxins and Furans (17 PCDD/F) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	1,2,3,4,6,7,8-HeptaCDD	< 0.131	pg/g		
	1,2,3,4,6,7,8-HeptaCDF	< 0.0918	pg/g		
	1,2,3,4,7,8,9-HeptaCDF	< 0.0639	pg/g		
	1,2,3,4,7,8-HexaCDD	< 0.0623	pg/g		
	1,2,3,4,7,8-HexaCDF	< 0.0967	pg/g		
	1,2,3,6,7,8-HexaCDD	< 0.0852	pg/g		
	1,2,3,6,7,8-HexaCDF	< 0.0885	pg/g		
	1,2,3,7,8,9-HexaCDD	< 0.0803	pg/g		
	1,2,3,7,8,9-HexaCDF	< 0.0656	pg/g		
	1,2,3,7,8-PentaCDD	< 0.0410	pg/g		
	1,2,3,7,8-PentaCDF	< 0.0590	pg/g		
	2,3,4,6,7,8-HexaCDF	< 0.0803	pg/g		
	2,3,4,7,8-PentaCDF	< 0.0918	pg/g		
	2,3,7,8-TetraCDD	< 0.0311	pg/g		

		Results	Unit	LOQ	LOD
☆ GFL01	Dioxins and Furans (17 PCDD/F) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	2,3,7,8-TetraCDF	< 0.0852	pg/g		
	OctaCDD	< 0.951	pg/g		
	OctaCDF	< 0.197	pg/g		
	WHO(2005)-PCDD/F TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCDD/F TEQ (upper-bound)	0.169	pg/g		
☆ GFL07	polychlorinated biphenyls (12 WHO PCB + 6 ICES PCB) Method: EC Reg 589/2014 (food) and EC Reg 709/2014 (feed)				
	PCB 101	< 0.164	ng/g		
	PCB 105	< 6.39	pg/g		
	PCB 114	< 0.869	pg/g		
	PCB 118	< 23.0	pg/g		
	PCB 123	< 0.656	pg/g		
	PCB 126	< 0.410	pg/g		
	PCB 138	< 0.164	ng/g		
	PCB 153	< 0.164	ng/g		
	PCB 156	< 3.61	pg/g		
	PCB 157	< 0.672	pg/g		
	PCB 167	< 1.80	pg/g		
	PCB 169	< 1.97	pg/g		
	PCB 180	< 0.164	ng/g		
	PCB 189	< 0.656	pg/g		
	PCB 28	< 0.164	ng/g		
	PCB 52	< 0.164	ng/g		
	PCB 77	< 16.4	pg/g		
	PCB 81	< 0.443	pg/g		
	Total 6 ndl-PCB (lower-bound)	Not Detected	ng/g		
	Total 6 ndl-PCB (upper-bound)	0.984	ng/g		
	WHO(2005)-PCB TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCB TEQ (upper-bound)	0.103	pg/g		
☆ GFTE1	TEQ-Totals WHO-PCDD/F and PCB Method: Internal method, Calculation				
	WHO(2005)-PCDD/F+PCB TEQ (lower-bound)	Not Detected	pg/g		
	WHO(2005)-PCDD/F+PCB TEQ (upper-bound)	0.272	pg/g		
☆ J1054	Sulphur (S) Method: DIN EN ISO 11885, mod.				
	Sulphur total (S)	10	mg/kg	2	
☆ J1056	Silicon (Si) Method: DIN EN ISO 11885, mod.				
	Silicon (Si)	150	mg/kg	2	
☆ J5003	Aflatoxin M1 (milk products) Method: Internal method, IAC-LC-FLD				
	Aflatoxin M1	<0.01	µg/kg	0.01	
☆ JCSRA	Solvent residues (big scope) Method: Internal method, HS-GC-MS				
	1,1,1,2-Tetrachloroethane	<0.01	mg/kg	0.01	
	1,1,1-Trichloroethane	<0.01	mg/kg	0.01	
	1,1,2-Trichloroethane	<0.01	mg/kg	0.01	
	1,1-Dichloroethane	<0.05	mg/kg	0.05	
	1,2-Dichloroethane	<0.05	mg/kg	0.05	
	2-Butanon (Methylethylketon)	<1	mg/kg	1	
	2-Methylpentane	<1	mg/kg	1	
	3-Methylpentane	<1	mg/kg	1	
	Benzene	<0.01	mg/kg	0.01	
	Bromodichloromethane	<0.05	mg/kg	0.05	
	Chloroform (trichloromethane)	<0.01	mg/kg	0.01	

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		Results	Unit	LOQ	LOD
☆ JCSRA	Solvent residues (big scope) Method: Internal method, HS-GC-MS				
	cis-Dichloroethene	<0.05	mg/kg	0.05	
	Dibromochloromethane	<0.05	mg/kg	0.05	
	Dichloromethane	<0.05	mg/kg	0.05	
	Ethyl Acetate	<1	mg/kg	1	
	Ethylbenzene	<0.01	mg/kg	0.01	
	m-/-p-Xylene	<0.01	mg/kg	0.01	
	Methylcyclopentane	<1	mg/kg	1	
	n-Heptane	<1	mg/kg	1	
	n-Hexane	<1	mg/kg	1	
	n-Pentane	<1	mg/kg	1	
	Styrene	<0.01	mg/kg	0.01	
	Sum 3 chlorinated solvents	Nicht berechenbar	mg/kg		
	Technical Hexane (calculated)	Nicht berechenbar	mg/kg		
	Tetrachloroethene	<0.01	mg/kg	0.01	
	Tetrachloromethane	<0.01	mg/kg	0.01	
	Toluene	<0.01	mg/kg	0.01	
	trans-Dichloroethene	<0.05	mg/kg	0.05	
	Tribromomethane	<0.05	mg/kg	0.05	
	Trichloroethene	<0.01	mg/kg	0.01	
	Xylene (ortho-)	<0.01	mg/kg	0.01	
☆ JJ04T	Phthalate + DEHA Method: Internal method, GC-MS				
	Acetyltributylcitrat (ATBC)	<1	mg/kg	1	
	Benzyl butyl phthalate (BBP)	<1	mg/kg	1	
	Dibutyl phthalate (DBP)	<0.3	mg/kg		0.3
	Diethyl hexyl phthalate (DEHP)	<1	mg/kg	1	
	Diethyl phthalate (DEP)	<1	mg/kg	1	
	Diethylhexyl adipate (DEHA)	<1	mg/kg	1	
	Di-isobutyl phthalate (DiBP)	<0.3	mg/kg		0.3
	Diisodecylphthalate (DIDP)	<5	mg/kg	5	
	Diisononylphthalate (DINP)	<5	mg/kg	5	
	Dimethyl phthalate (DMP)	<1	mg/kg	1	
	DINCH	<5	mg/kg	5	
	Dioctyl phthalate (D-n-OP)	<1	mg/kg	1	
	Triisobutyl phosphate	<1	mg/kg	1	
☆ JJ088	Fumonisine B1, B2, B3 (maize and products derived from maize) Method: Internal Method, LC-MS/MS				
	Fumonisin B1 (FB1)	<20	µg/kg	20	
	Fumonisin B2 (FB2)	<20	µg/kg	20	
	Fumonisin B3 (FB3)	<20	µg/kg	20	
	Fumonisin sum (B1+B2)	<40	µg/kg	40	
	Fumonisin sum (B1+B2+B3)	<60	µg/kg		
☆ JJ0EW	Aflatoxin B1, B2, G1, G2 (spices, special matrix) Method: internal method based on EN 14123				
	Aflatoxin B1	<1	µg/kg	1	
	Aflatoxin B2	<1	µg/kg	1	
	Aflatoxin G1	<1	µg/kg	1	
	Aflatoxin G2	<1	µg/kg	1	
	Sum of all positive Aflatoxins	<4	µg/kg		
☆ JJ0FE	Fusarium toxins (DON, ZON, T2, HT2) Method: Internal method, LC-MS/MS				
	Deoxynivalenol (Vomitoxin)	<20	µg/kg	20	
	HT-2 Toxin	<10	µg/kg	10	
	sum T-2 HT-2 toxin	<20	µg/kg	20	
	T-2 Toxin	<10	µg/kg	10	

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		Results	Unit	LOQ	LOD
☆ JJ0FE	Fusarium toxins (DON, ZON, T2, HT2) Method: Internal method, LC-MS/MS				
	Zearalenone (ZON)	<10	µg/kg	10	
☆ JJ0G5	Ochratoxin A (spices, special matrix) Method: internal method based on EN 14132, IAC-LC-FLD				
	Ochratoxin A (OTA)	<2	µg/kg	2	
☆ JJ0HV	Free fatty acids (FFA) Method: DGF C-V 2				
	Acid value (mg KOH/g)	<0.2	mg KOH/g	0.2	
	Free fatty acids (calculated as lauric acid)	<0.1	%	0.1	
	Free fatty acids (calculated as oleic acid)	<0.1	%	0.1	
	Free fatty acids (calculated as palmitic acid)	<0.1	%	0.1	
☆ JJW2Z	Sterigmatocystin Method: Internal method, LC-MS/MS				
	Sterigmatocystin	<10	µg/kg	10	
☆ JK07G	Unsaponifiable matter Method: ISO 18609				
	Unsaponifiable matter	0.8	%	0.1	
☆ QA049	Polynuclear Aromatic Hydrocarbons (GC-MS) Method: Internal method, GC-MS				
	Acenaphthene	<1.0	µg/kg	1	
	Acenaphthylene	<2.0	µg/kg	2	
	Anthracene	<2.0	µg/kg	2	
	Benzo(a)anthracene	<0.50	µg/kg	0.5	
	Benzo(a)pyrene	<0.50	µg/kg	0.5	
	Benzo-(b)-Fluoranthene	<0.50	µg/kg	0.5	
	Benzo(ghi)perylene	<2.0	µg/kg	2	
	Benzo(k)fluoranthene	<3.0	µg/kg	3	
	Chrysene	<0.50	µg/kg	0.5	
	Dibenzo(a,h)anthracene	<3.0	µg/kg	3	
	Fluoranthene	<1.0	µg/kg	1	
	Fluorene	<2.0	µg/kg	2	
	Indeno(1,2,3-cd)pyrene	<2.0	µg/kg	2	
	Naphthalene	<20	µg/kg	20	
	Phenanthrene	2.5	µg/kg	2	
	Pyrene	<1.0	µg/kg	1	
☆ QA117	Anisidine Value (ISO Method) Method: ISO 6885				
	Anisidine Value	1.6		1	
☆ QA156	Fatty Acid Profile Method: AOAC 996.06				
	C 6:0 (Caproic acid)	<0.020	g/100 g	0.02	
	C 8:0 (Caprylic acid)	<0.020	g/100 g	0.02	
	C 10:0 (Capric acid)	<0.020	g/100 g	0.02	
	C 12:0 (Lauric acid)	<0.020	g/100 g	0.02	
	C 14:0 (Myristic acid)	0.387	g/100 g	0.02	
	C 14:1 (Myristoleic acid)	<0.020	g/100 g	0.02	
	C 15:0 (Pentadecanoic acid)	<0.020	g/100 g	0.02	
	C 15:1 (Pentadecenoic acid)	<0.020	g/100 g	0.02	
	C 16:0 (Palmitic acid)	7.274	g/100 g	0.02	
	C 16:1 (Palmitoleic acid)	0.122	g/100 g	0.02	
	C 17:0 (Margaric acid)	0.245	g/100 g	0.02	
	C 17:1 (Heptadecenoic acid)	0.068	g/100 g	0.02	
	C 18:0 (Stearic acid)	6.714	g/100 g	0.02	
	C 18:1 (Oleic acid)	5.924	g/100 g	0.02	
	C 18:1n7 (Vaccenic acid)	0.283	g/100 g	0.02	
	C 18:2n6 (Linoleic acid)	6.044	g/100 g	0.02	
	C 18:3n3 (alpha-Linolenic Acid)	0.074	g/100 g	0.02	
	C 18:3n6 (gamma-Linolenic Acid)	2.455	g/100 g	0.02	

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		Results	Unit	LOQ	LOD
☆ QA156	Fatty Acid Profile Method: AOAC 996.06				
	C 20:0 (Arachidic acid)	0.872	g/100 g	0.02	
	C 20:1 (Eicosenoic acid)	0.434	g/100 g	0.02	
	C 20:2n6 (Eicosodienoic acid)	0.418	g/100 g	0.02	
	C 20:3n3 (Eicosatrienoic acid)	0.229	g/100 g	0.02	
	C 20:3n6 (homo-gamma-Linolenic acid)	4.794	g/100 g	0.02	
	C 20:4n6 (Aracihdonic Acid)	44.067	g/100 g	0.02	
	C 20:5n3 (Eicosapentaenoic acid)	0.101	g/100 g	0.02	
	C 21:0 (Heneicosanoic acid)	0.067	g/100 g	0.02	
	C 22:0 (Behenic acid)	3.400	g/100 g	0.02	
	C 22:1n9 (Erucic acid)	0.114	g/100 g	0.02	
	C 22:2n6 (Docosadienoic acid)	<0.020	g/100 g	0.02	
	C 22:6n3 (Docosahexaenoic acid)	<0.020	g/100 g	0.02	
	C 22-5n3 (Docosapentaenoic acid)	<0.020	g/100 g	0.02	
	C 22-5n6 (Docosapentaenoic acid)	<0.020	g/100 g	0.02	
	C 23:0 (Tricosanoic acid)	<0.020	g/100 g	0.02	
	C 24:0 (Lignoceric acid)	11.135	g/100 g	0.02	
	C 24:1 (Nervonic acid)	0.372	g/100 g	0.02	
	Monounsaturated Fat	7.405	g/100 g	0.02	
	Omega-3 fatty acids	0.405	g/100 g	0.02	
	Omega-6 fatty acids	57.775	g/100 g	0.02	
	Polyunsaturated Fat	58.180	g/100 g	0.02	
	Saturated Fat	30.090	g/100 g	0.02	
	Total Fat	95.68	g/100 g	0.02	
☆ QA184	Arachidonic Acid (ARA) Method: AOCS Ce 1b-89				
	C 20:4n6 (Arachidonic acid)	422.5	mg/g	0.1	
☆ QA307	Glyceride Profile Method: AOCS Cd 11c-93				
	Diglycerides	4.26	%	1	
	Glycerol	<1.00	%	1	
	Monoglycerides	<1.00	%	1	
	Triglycerides	93.77	%	1	
☆ QA934	Trans Fatty Acids, relative area% (GC-FID) Method: AOCS 2a-94				
	Total Trans Fatty Acids	0.25	%	0.05	
☆ QD04J	Lovibond Color - Lovibond Scale Method: AOCS Cc 13j-97, Cc 13e-92				
	Lovibond Color - Lovibond Scale	0.1R,0.9Y,0.0B,0.0N			
☆ QD106	Iodine Value Method: AOCS Cd 1d-92				
	Iodine value	182.9			
☆ S1102	Dithiocarbamates Method: EN 12396-3:2000				
	Dithiocarbamates (as CS2)	< 0.1	mg/kg	0.1	
☆ SF7DN	Fipronil Method: Internal method, GC-MS				
	Fipronil	<0.04 *	mg/kg	0.04	
☆ SF7K0	Fipronil, desulfinyl- Method: Internal method, GC-MS				
	Fipronil, desulfinyl-	<0.04 *	mg/kg	0.04	
☆ SP421	Organochlorine Pesticides, Pyrethroides Method: ASU L00.00-34				
	Screened pesticides	Not Detected			
☆ SP424	Organophosphorus Pesticides Method: ASU L00.00-34				
	Screened pesticides	Not Detected			
☆ SPGZ5	Organotin Pesticides Method: Internal method, GC-MS				
	Cyhexatin/Azocyclotin (Sum)	—	mg/kg		
☆ SU007	Mercury (AAS) Method: BS EN 13806:2002				
	Mercury (Hg)	<0.005	mg/kg	0.005	
☆ SU04N	Sodium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Sodium (Na)	<1	mg/100 g	1	

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		Results	Unit	LOQ	LOD
☆ SU051	Manganese (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Manganese (Mn)	<0.1	mg/kg	0.1	
☆ SU055	Molybdenum (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Molybdenum (Mo)	<0.1	mg/kg	0.1	
☆ SU056	Nickel (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Nickel (Ni)	<0.1	mg/kg	0.1	
☆ SU05D	Lead (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Lead (Pb)	<0.05	mg/kg	0.05	
☆ SU05E	Arsenic (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Arsenic (As)	<0.1	mg/kg	0.1	
☆ SU05F	Chromium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Chromium (Cr)	<0.1	mg/kg	0.1	
☆ SU05G	Cadmium (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Cadmium (Cd)	<0.01	mg/kg	0.01	
☆ SU05H	Iron (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Iron (Fe)	0.26	mg/kg	0.1	
☆ SU05J	Copper (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Copper (Cu)	0.81	mg/kg	0.1	
☆ SU05K	Phosphorus (ICP-MS) Method: BS EN ISO 17294-2 2004 mod.				
	Phosphorus (P)	36.7	mg/kg	5	
☆ SU207	Peroxide value Method: AOCS Cd 8b-90:2003				
	Peroxide value	<0.05	meq/kg	0.05	
☆ SU20L	Protein Method: AOAC 984.13				
	Protein	<0.1 (k=6.25)	g/100 g	0.1	
☆ SU20Q	Dietary fiber Method: AOAC 991.43				
	Dietary fiber	<0.5	g/100 g	0.5	
☆ SU20U	Total fat Method: AOAC 963.15				
	Total fat	100.0	g/100 g	0.1	
☆ SU20Y	Moisture (Direct drying method) Method: AOAC 935.29				
	Moisture	0.12	g/100 g	0.01	
☆ SU21B	Energy				
	Energy kcal (calculated)	900	kcal/100 g		
	Energy kJ (calculated)	3700	kJ/100 g		
☆ SU21C	Carbohydrates				
	Carbohydrates (available)	<0.1	g/100 g	0.1	
	Total carbohydrates	<0.1	g/100 g	0.1	
☆ SU21J	Moisture and Volatile matter Method: ISO 662:1998				
	moisture and volatile matter content	0.03	g/100 g	0.01	
☆ SU21L	Sugar Profile Method: AOAC 995.13, modified				
	Fructose	<0.1	g/100 g	0.1	
	Galactose	<0.1	g/100 g	0.1	
	Glucose	<0.1	g/100 g	0.1	
	Lactose	<0.1	g/100 g	0.1	
	Maltose	<0.1	g/100 g	0.1	
	Monosaccharides and Disaccharides	<0.1	g/100 g	0.1	
	Sucrose	<0.1	g/100 g	0.1	
☆ SU227	Ash Method: AOAC 941.12				
	Ash	<0.1	g/100 g	0.01	
• SU9QW	Butane residual Method: Internal method, Internal Method GC-MS				
	Butane	Not Detected	mg/kg	1	
VV00B	Coliforms Method: ISO 4832:2006				
	Coliforms	<1	cfu/ml		
VV00D	Yeasts and moulds Method: ISO 21527:2008				
	Moulds	<1	cfu/ml		
	Yeast	<1	cfu/ml		

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		Results	Unit	LOQ	LOD
VV00E	Salmonella Method: ISO 6579:2002				
	Salmonella	Not Detected	/25 g		
VV00G	Bacillus cereus Method: ISO 7932:2004				
	Bacillus cereus	<1	cfu/ml		
VV00P	Aerobic plate count Method: ISO 4833-1:2013				
	Aerobic plate count	<1	cfu/ml		
VV00V	Enterobacter sakazakii Method: ISO/TS 22964:2006				
	Cronobacter spp	Not Detected	/25 g		
VV0A2	Listeria monocytogenes Method: ISO 11290-1:1996/Amd.1:2004				
	Listeria monocytogenes	Not Detected	/25 g		
VV0A3	Coagulase-positive staphylococci Method: ISO 6888-1:1999/AMD 1:2003				
	Coagulase-positive staphylococci	<1	cfu/ml		
VV0A4	Escherichia coli Method: ISO 16649-2:2001				
	Escherichia coli	<1	cfu/ml		

List of screened and not detected molecules (* = limit of quantification)

SP421 Organochlorine Pesticides, Pyrethroides (LOQ* mg/kg)

2.3.4.6-Tetrachloranisol (0.005)	Acrinathrin (0.05)	Aldrin (0.005)	Aldrin/ Dieldrin (Sum) ()	Benfluralin (0.005)	
Benzoylprop-ethyl (0.01)	Bifenox (0.02)	Binapacryl (0.02)	Bifenthrin (0.05)	Bromocyclen (0.01)	Bromoxynil-octanoate (0.01)
Butralin (0.02)	Chlordane (total) ()	Chlordane, cis- (0.005)	Chlordane, oxy- (0.005)	Chlordane, trans- (0.005)	Chlorfenapyr (0.01)
Chlorfenprop-methyl (0.02)	Chlorfenson (0.01)	Chloroneb (0.02)	Chlorothalonil (0.01)	Chlorthal-dimethyl (0.005)	Cyfluthrin (0.05)
Cyhalothrin, lambda- (0.05)	Cypermethrin (0.05)	Cyphenothrin (0.05)	DDD, o,p- (0.005)	DDD, p,p'- (0.005)	DDE, o,p- (0.005)
DDE, p,p'- (0.005)	DDT (total) ()	DDT, o,p'- (0.005)	DDT, p,p'- (0.005)	Deltamethrin (0.05)	Dibromobenzophenone, p,p- (0.02)
Dichlobenil (0.01)	Dichlone (0.02)	Dicloran (0.005)	Dichlorobenzophenone, o,p- (0.02)	Dichlorobenzophenone, p,p- (0.02)	Dicofol (sum) ()
Dicofol, o,p- (0.02)	Dicofol, p,p- (0.02)	Dieldrin (0.005)	Dienochlor (0.01)	Dinitramine (0.01)	Dinobuton (0.02)
Endosulfan (total) ()	Endosulfan, alpha- (0.005)	Endosulfan sulphate (0.01)	Endosulfan, beta- (0.005)	Endrin (0.005)	Endrin ketone (0.01)
Ethalfluralin (0.01)	Etridiazole (0.01)	Fenfluthrin (0.05)	Fenpropathrin (0.05)	Fenson (0.01)	Fenvalerate (RR-/SS-isomers) (0.05)
Fenvalerate (RS-/SR-isomers) (0.05)	Flubenzimine (0.01)	Fluchloralin (0.01)	Flucythrinate (0.05)	Flumetralin (0.01)	Fluorodifen (0.01)
Fluoroimide (0.02)	Genite (0.01)	Halfenprox (0.05)	HCH isomers (without lindane) ()	HCH, alpha- (0.005)	HCH, beta- (0.005)
HCH, delta- (0.005)	HCH, epsilon- (0.005)	Lindane (gamma-HCH) (0.005)	Heptachlor (0.005)	Heptachlor (sum) ()	Heptachlor epoxide, cis- (0.005)
Heptachlor epoxide, trans- (0.005)	Hexachlorobenzene (HCB) (0.005)	Ioxynil-octanoate (0.01)	Isobenzan (0.005)	Isodrin (0.005)	Isopropalin (0.01)
Methoxychlor (0.01)	Mirex (0.005)	Nitrapyrin (0.01)	Nitrofen (0.01)	Nonachlor, trans- (0.005)	Octachlorstyrene (0.005)
Oxyfluorfen (0.01)	Pendimethalin (0.01)	Pentachloranisole (0.005)	Pentachloroaniline (0.005)	Pentachlorobenzene (0.01)	Pentachlorothioanisole (0.005)
Permethrin (0.05)	Piifenate (0.02)	Polychloroterpene (Camphechlor) (0.5)	Profluralin (0.005)	Quintozene (0.005)	Quintozene (sum) ()
S 421 (0.01)	tau-Fluvalinate (0.05)	Tecnazene (0.005)	Teflutrin (0.05)	Tetradifon (0.01)	Tetrasul (0.01)
Tralomethrin (0.05)	Transfluthrin (0.05)	Triallate (0.02)	Trichloronat (0.01)	Trifluralin (0.005)	

SP424 Organophosphorus Pesticides (LOQ* mg/kg)

Acephate (0.02)	Azinphos-ethyl (0.05)	Azinphos-methyl (0.05)	Bromfenvinphos (0.02)	Bromophos-methyl (0.02)	Bromophos-ethyl (0.02)
Butamifos (0.02)	Cadusaphos (0.02)	Carbophenothion (0.02)	Carbophenothion-methyl (0.02)	Chlorfenvinphos (0.02)	Chlormephos (0.02)
Chlorpyrifos (-ethyl) (0.02)	Chlorpyrifos-methyl (0.02)	Chlorthion (0.02)	Chlorthiophos (0.02)	Coumaphos (0.1)	Crotoxyphos (0.02)
Crufomate (0.02)	Cyanofenphos (0.05)	Cyanophos (0.02)	Demeton-S-methyl (0.05)	Demeton-S-methyl-sulfone (0.1)	Dialifos (0.02)
Diazinon (0.02)	Dicapthon (0.02)	Dichlofenthion (0.02)	Dichlorvos (0.02)	Dicrotophos (0.02)	Dimefox (0.02)
Dimethoate (0.02)	Dimethylvinphos (0.02)	Dioxabenzofos (0.02)	Dioxathion (0.05)	Disulfoton (0.05)	Disulfoton-sulfon (0.05)
Disulfoton-sulfoxide (0.05)	Ditalimfos (0.02)	Edifenphos (0.05)	Ethion (0.02)	Ethoprophos (0.02)	Etrimfos (0.02)
Fenamiphos (0.02)	Fenamiphos-sulfone (0.05)	Fenamiphos-sulfoxide (0.05)	Fenchlorphos (0.02)	Fenchlorphos oxon (0.05)	Fenitrothion (0.02)
Fensulfothion (0.02)	Fensulfothion-oxon-sulfone (0.05)	Fensulfothion-oxon-sulfoxide (0.05)	Fensulfothion-sulfone (0.05)	Fenthion (0.02)	Fenthion-oxon-sulfone (0.05)
Fenthion-oxon-sulfoxide (0.05)	Fenthion-sulfone (0.05)	Fenthion-sulfoxide (0.05)	Fonofos (0.02)	Formothion (0.02)	Fosthiazate (0.05)
Fosthietan (0.02)	Heptenophos (0.02)	Iodofenphos (0.05)	Iprobenfos (0.02)	Isazophos (0.02)	Isocarbofos (0.02)
Isofenphos (0.02)	Isofenphos-methyl (0.02)	Isoxathion (0.05)	Leptophos (0.05)	Malaoxon (0.02)	Malathion (0.02)
Mecarbam (0.02)	Mephosfolan (0.02)	Merphos (0.05)	Methacrifos (0.02)	Methamidophos (0.02)	Methidathion (0.02)
Mevinphos (0.02)	Monocrotophos (0.02)	Morphothion (0.05)	Omethoate (0.02)	Oxydemeton-methyl (0.1)	Paraoxon-ethyl (0.02)
Paraoxon-methyl (0.02)	Parathion (0.02)	Parathion-methyl (0.02)	Phenkapton (0.05)	Phenthoate (0.02)	Phorate (0.02)
Phorate-sulfone (0.05)	Phorate-sulfoxide (0.05)	Phosalone (0.05)	Phosmet (0.05)	Phosphamidon (0.02)	Pirimiphos-ethyl (0.02)
Pirimiphos-methyl (0.02)	Profenofos (0.02)	Propaphos (0.02)	Propetamphos (0.02)	Prothiofos (0.02)	Prothoate (0.02)
Pyraclofos (0.05)	Pyrazophos (0.05)	Pyridaphenthion (0.02)	Quinalphos (0.02)	Quintiofos (0.02)	Sulfotep (0.02)
Sulprofos (0.05)	TEPP (0.02)	Terbufos (0.02)	Terbufos-sulfone (0.05)	Tetrachlorvinphos (0.02)	Thiometon (0.02)
Tolclofos-methyl (0.02)	Triamiphos (0.05)	Triazophos (0.02)	Trichlorfon (0.1)	Vamidothion (0.05)	

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(b) (6)

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EXPLANATORY NOTE

≥ Greater than or equal to

< Less than

≤ Less than or equal to

N/A means Not applicable

☆ means the test is subcontracted within Eurofins group

* means the test is subcontracted outside Eurofins group

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Analytical Report

Sample Code	128-2017-00003832	Report date	27-May-2017
Certificate No.	AR-17-VV-004039-04		

This report is translated from report AR-17-VV-004039-03

Linyi Youkang Biology Co., Ltd.

Racheal GAO
Lianbang Road,
Economical and Technical Development Area,
Linyi City, ShanDong Province

Our reference:	128-2017-00003832/ AR-17-VV-004039-04
Client Sample Code:	A2017030201
Sample described as:	ARACHIDONIC ACID OIL
Sample Packaging:	Sealed aluminum foil bag
Sample reception date:	27-Apr-2017
Analysis starting date:	27-Apr-2017
Analysis ending date:	27-May-2017
Arrival Temperature (°C)	20.1
Sample Weight	220g

	Results	Unit	LOQ	LOD
☆ JJ0HV Free fatty acids (FFA) Method: DGF C-V 2				
Acid value (mg KOH/g)	<0.2	mg KOH/g	0.2	
Free fatty acids (calculated as lauric acid)	<0.1	%	0.1	
Free fatty acids (calculated as oleic acid)	<0.1	%	0.1	
Free fatty acids (calculated as palmitic acid)	<0.1	%	0.1	
☆ JK07G Unsaponifiable matter Method: ISO 18609				
Unsaponifiable matter	0.7	%	0.1	
☆ QA117 Anisidine Value (ISO Method) Method: ISO 6885				
Anisidine Value	3.5		1	
☆ QA184 Arachidonic Acid (ARA) Method: AOCS Ce 1b-89				
C 20:4n6 (Arachidonic Acid)	421.8	mg/g	0.1	
☆ QD04J Lovibond Color - Lovibond Scale Method: AOCS Cc 13j-97, Cc 13e-92				
Lovibond Color - Lovibond Scale	1.1R,11.0Y,0.0B, 0.5N			
☆ SU207 Peroxide value Method: AOCS Cd 8b-90:2003				
Peroxide value	2.05	meq/kg	0.05	

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Analytical Report

Sample Code	128-2017-00008163	Report date	18-Aug-2017
Certificate No.	AR-17-VV-007754-01		

Linyi Youkang Biology Co., Ltd.

Racheal GAO
Lianbang Road,
Economical and Technical Development Area,
Linyi City, ShanDong Province

Our reference:	128-2017-00008163/ AR-17-VV-007754-01
Client Sample Code:	2017011001 2017020701 2017030101
Sample described as:	ARACHIDONIC ACID POWDER
Sample Packaging:	Sealed metal bottle
Sample reception date:	07-Aug-2017
Analysis starting date:	07-Aug-2017
Analysis ending date:	18-Aug-2017
Arrival Temperature (°C)	5
Sample Weight	50g

	Results	Unit	LOQ	LOD
☆ FL023 Plant sterols and plant stanols (not enriched) Method: NMKL 198:2014				
24-Methylenecycloartanol	<1	mg/100 g	1	
Brassicasterol	22	mg/100 g	1	
Campesterol	5	mg/100 g	1	
Cholesterol	2	mg/100 g	1	
Citrostadienol	1	mg/100 g	1	
Cycloartenol	<1	mg/100 g	1	
Delta-5,24-stigmastadienol	1	mg/100 g	1	
delta-7-Avenasterol	<1	mg/100 g	1	
Delta-7-stigmastenol	<1	mg/100 g	1	
Sitostanol+ delta-5-avenasterol	2	mg/100 g	1	
Sitosterol	12	mg/100 g	1	
Stigmasterol	1	mg/100 g	1	
Total plant sterols + plant stanols	162	mg/100 g	1	
Unidentified sterols	119	mg/100 g	1	

COMMENT

Due to the sample matrix the results are reported without accrediation. This sample seems to contain unusual phytosterols and, therefore, the peak identifications have to be treated only tentative.

Cholesterol is not included in the sum of plant sterols and plant stanols.

The analysis of 24-Methylene-Cholesterol does not belong to our normal scope, but the component has been tentatively identified based on ISO 12228 standard method eluting just in front of Campesterol in the chromatogram.

SIGNATURE (b) (6)

Kevin Fu
Authorized Signatory

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EXPLANATORY NOTE

≥ Greater than or equal to
< Less than
≤ Less than or equal to
N/A means Not applicable

☆ means the test is subcontracted within Eurofins group
• means the test is subcontracted outside Eurofins group

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END OF REPORT

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