CODEX ALIMENTARIUS COMMISSION E

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World Health Organization

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Agenda Item 12 **CX/FO 13/23/12**

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OTHER BUSINESS AND FUTURE WORK

PROPOSED DRAFT AMENDMENT TO THE STANDARD FOR NAMED VEGETABLE OILS (CODEX STAN 210-1999): FATTY ACID COMPOSITION AND OTHER QUALITY FACTORS OF PEANUT OIL

(Proposed by Argentina)

INTRODUCTION AND BACKGROUND

Argentina submits this document with the purpose of discussing the revision of the limits of some fatty acid composition profiles of peanut oil and other related quality factors, so the adjustment of these parameters help represent reliably the worldwide variability of peanut oils currently traded.

At present, the Codex Standard for Named Vegetable Oils (CODEX STAN 210-1999) sets some fatty acid composition values which do not reflect the situation of the oils currently produced in Argentina. Considering that Argentina is one of the leading exporters of crude peanut oil, we believe it pertinent to make a revision of the parameters of fatty acids and, therefore, of iodine value and relative density, since current paramenters do not take into account the variability of Argentine peanut oil production, and consequently, fail to reflect the reality of international trade.

Argentina considers that the revision and subsequent amendment of the parameters being questioned will enable Codex Member countries, the food industry and processors to classify as "peanut oil" those oils whose quality and composition values currently fall outside the Codex Standard and, as a result, to trade them properly and in a facilitated manner, thus fulfilling the goal 1.6 of the Codex Strategic Plan, which establishes that standards should be developed taking into account global variability.

In Argentina, about 260,000 hectares of peanuts are sown and 80% of this production is exported, consolidating our country as one of the leading exporters of top-quality peanuts, which are demanded by the world's major markets. In 2011, Argentina exported some 530,000 tons of peanuts, out of which 38,312 tons corresponded to peanut oil.

At present, peanut varieties with high content of oleic acid are used in approximately 60% of the total sown area in Argentina, and it is expected that, in the coming years, this percentage will increase, due to the tendency to obtain a better quality product with recognized health benefits resulting from higher monounsaturated levels.

In this way, higher quality oils are obtained and this is reflected in the fatty acid composition. Consequently, this generates some quality and authenticity parameters for peanut oils which do not fall within the scope of the Standard, thus hindering international trade in this product.

This has been proved by studies conducted by the National Institute of Agricultural Technology (INTA), the Argentine Peanut Foundation and the Argentine Peanut Board in "Characterization of the Quality of the Argentine Confectionery Peanut. Chemical and Nutritional Composition. Fatty Acid Profile. Crop Years 2007, 2008 and 2010", and by the study published in Revista Aceites y Grasas (Fats and Oils Journal), 2008: "An Overview of the Different Denominations from their Acidic Composition in Dissimilar Species of Vegetable Oils. Sunflower and Peanut Oil." In these studies, attached to this document, the variability in terms of the fatty acid composition of the varieties used in Argentina is proved, showing that a large proportion of the oils produced is not covered by Codex-Stan 210.

Also, different importers, having recognized the quality of Argentine oils and expressed their interest, admitted this situation and suggested, through their representative institutions, the use of ranges similar to those proposed in this document.

It should be borne in mind that Codex Alimentarius Standards constitute the international reference for the WTO in the field of food and, therefore, should be revised to ensure that the parameters applied are consistent with global variability; without a scientific basis, current parameters are discriminating Argentine peanut oils unreasonably.

One of the Codex Alimentarius mandates is the commitment to revise, where appropriate, the standards and related texts in the light of new scientific knowledge and other relevant information, in order to represent the global variability of foodstuffs and avoid further restrictions on trade than necessary.

It should be stressed that, in the coming years, this problem is expected to be considerably magnified due to the increase in the use of varieties with high oleic acid content, which will cause technical barriers to trade in peanut oil.

In this regard, Argentina believes that this legitimate concern should be addressed in the context of the Codex Alimentarius, in order to amend the parameters of the fatty acid profiles and other quality factors, always on a scientific basis and supported by serious studies, such as those conducted by Argentina in this regard.

PARAMETERS CONCERNED

In particular, Argentina suggests the revision of the following parameters, which currently differ from Codex Stan-210 for Named Vegetable Oils:

Fatty acids:

C16:0 (Palmitic acid), C18:1 (Oleic acid), C18:2 (Linoleic acid), C20:0 (Arachidonic acid), C20:1 (Eicosenoic acid) and C22:1 (Erucic acid).

Other quality factors:

Iodine value

Relative density at 20°C

The following is the comparison between Argentina's proposal and theCodex Standard (modified limits are in bold):

Fatty Acid Composition Profile of the Peanut Oil

Fatty acids	Argentina's proposal	CODEX-STAN 210
C16:0	**5.0**-14.0	8.0-14.0
C16:1	ND-0.2	ND-0.2
C18:0	1.0-4.5	1.0-4.5
C18:1	35.0-**80**	35.0-69.0
C18:2	**4.0**-43.0	12.0-43.0
C18:3	ND-0.3	ND-0.3
C20:0	**0.7**-2.0	1.0-2.0
C20:1	0.7-**3.2**	0.7-1.7
C22:0	1.5-4.5	1.5-4.5
C22:1	ND-**0.55**	ND-0.3
C24:0	0.5-2.5	0.5-2.5
C24:1	ND-0.3	ND-0.3

Other quality parameters:

Iodine value
Codex: 86-107
Argentina's proposal: 77-107

Relative density
Codex: 0.912-0.920 x=20ºC
Argentina's proposal: 0.909-0.920 x=20ºC

CONCLUSIONS

Argentina has developed this proposal to amend Codex Stan 210 because, at present, there is a production of peanut oil whose national and global variability in terms of fatty acid composition is not reflected in the current Standard.

Argentina is one of the world's leading exporters of peanut oil and believes it important to address this issue in the CCFO, in view of the oils derived from new peanut varieties grown in Argentina.

To this end, and based on supporting scientific studies on the acid composition profile, Argentina suggests amending the Codex Standard for Named Vegetable Oils.

PROPOSAL FOR NEW WORK TO AMEND THE STANDARD FOR NAMED VEGETABLE OILS (CODEX STAN 210-1999): FATTY ACID COMPOSITION AND OTHER QUALITY FACTORS OF PEANUT OIL

(Prepared by Argentina)

This draft document has been developed according to the *Codex Alimentarius Commission Procedural Manual*, 20th Edition, 2010, Section II - Procedures for the Elaboration of Codex Standards and Related Texts, *Part 2 - Critical review of proposals for new work and monitoring of progress in the development of standards (page 43 of the Spanish version)*.

1. Purpose and scope of the standard

The purpose of this new work is to revise the Codex Standard for Named Vegetable Oils, in order to modify some acid composition profiles of peanut oil and the corresponding quality factors, with the aim of supporting, through the introduction of such adjustments, the variability of peanut oils currently traded that fall outside the standard.

Argentina, as one of the world's main exporters of crude peanut oil, has noticed that there are genuine Argentine peanut oils in the market that are not covered by Codex STAN 210/1999 and, consequently, cannot be classified, even when they come from certified peanut seeds.

In particular, deviations are noticed in the following fatty acids: C16:0 (Palmitic acid), C18:1 (Oleic acid), C18:2 (Linoleic acid), C20:0 (Arachidonic acid), C20:1 (Eicosenoic acid) and C22:1 (Erucic acid).

In addition, the authenticity parameters should be adjusted:

Iodine value
Relative density

The aim of this new work is to revise the composition and quality parameters that define peanut oil, proposing the characterization of the fatty acids mentioned, as well as their respective values of physical and chemical characteristics.

2. Relevance and timeliness:

Argentina is one of the few countries in the world that produce high quality peanuts for human consumption and, consequently, a peanut oil of great quality and taste, whose properties as food are highly beneficial and which is an important input for the food industry of snacks and confectionery.

An important aspect of Argentine peanut oils in terms of their nutritional quality is that, in recent years, the use of varieties with higher oleic acid content has increased, with a strong tendency to rise in subsequent crop seasons. This makes the resulting oil have an acid profile not currently covered in the Codex Standard.

In order to ensure a regional and/or international trade that is fair, dynamic and transparent, it is essential that Codex consider amending the parameters related to the content of fatty acids, with a view to providing a framework adapted to the peanut oils currently traded and consistent from the stoichiometric calculation point of view, thus supporting the concept of genuineness and associated quality factors.

3. Main aspects to be covered

The proposed new work to amend the Standard for Named Vegetable Oils will be conducted under the existing procedures for Codex standards and will include, among others, the following:

Essential composition and quality factors;
Tables with the characteristic fatty acid composition;
Other quality and composition factors.

Profile of fatty acid composition for peanut oil

Fatty acids	Argentina's proposal	CODEX-STAN 210
C16:0	**5.0**-14.0	8.0-14.0
C16:1	ND-0.2	ND-0.2
C18:0	1.0-4.5	1.0-4.5
C18:1	35.0-**80**	35.0-69.0
C18:2	**4.0**-43.0	12.0-43.0
C18:3	ND-0.3	ND-0.3
C20:0	**0.7**-2.0	1.0-2.0
C20:1	0.7-**3.2**	0.7-1.7
C22:0	1.5-4.5	1.5-4.5
C22:1	ND-**0.55**	ND-0.3
C24:0	0.5-2.5	0.5-2.5
C24:1	ND-0.3	ND-0.3

Other quality parameters

Iodine value
Codex: 86-107
Argentina's proposal: 77-107

Relative density
Codex: 0.912-0.920 x=20ºC
Argentina's proposal: 0.909-0.920 x=20ºC

4. Assessment against the Criteria for the establishment of work priorities

This proposal is consistent with the Criteria for the establishment of work priorities applicable to both commodities and general subjects, under the provisions of the Codex Alimentarius Commission Procedural Manual, 20th edition.

a) Volume of production and consumption in individual countries, and volume and pattern of trade between countries.

Argentina exports 80% of its total peanut production and the approximate total sown area is 260,000 hectares. In 2011, Argentina exported some 530,000 tons of peanuts and approximately 38,312 tons of peanut oil to major markets worldwide.

Around 65% of Argentine peanut exports go to the EU (mainly Holland, Germany, England, Spain, Italy, Greece and France), and the rest is split among USA, Canada, Mexico, United Arab Emirates, South Africa, Brazil, Australia, Chile, Russia, Algeria, Ukraine, China, India, Jordan, Taiwan, Japan, Thailand and other countries.

b) Diversification of national legislations and apparent resultant or potential impediments to international trade

In recent years, due to the use of new peanut varieties, the genuine peanut oil obtained has presented a fatty acid composition and quality parameters that do not fall within the values set by the Codex Standard. This could lead to difficulties in and barriers to trade.

The proposed amendment to the Codex Standard for Named Vegetable Oils (CODEX-Stan 210) will help provide a harmonized international approach to quality and compositional factors and will facilitate world trade in peanut oil.

c) International or regional market potential

There is a peanut oil market highly valued at regional and international levels that is affected by problems arising from the formal classification of the Codex Stan-210, which leads to difficulties in trade.
The following are statistics of peanut oil in tons:

Global production, imports and exports of peanut oil
(thousands of tons, January/February)

	2007	**2008**	**2009**	**2010**	**2011**
Importers					
EU-27	97.5	90.7	83.6	83.0	82.0
USA	15.5	38.0	33.6	26.0	15.0
China	11.2	5.9	20.7	68.0	61.0
Hong Kong	13.2	12.3	11.9	16.0	12.0
Others	31.8	34.0	34.4	33.0	29.0
Total	**169.2**	**180.9**	**184.2**	**226.0**	**199.0**
Exports					
Senegal	68.7	12.3	30.9	50.0	58.2
ARGENTINA	**43.7**	**43.2**	**82.0**	**68.4**	**38.3**
Brazil	9.2	19.5	31.1	24.0	23.5
China	10.3	10.7	9.8	8.0	9.0
India	12.4	21.0	2.0	ND	8.0
Others	63.4	72.1	57.4	59.0	63.0
Total	**207.7**	**178.8**	**213.2**	**209.4**	**200.0**

Source: OilWorld / United Nations Commodity Trade Statistics Database (Comtrade) / FAOSTAT.

Main destinations of Argentine exports

	2008	2009	2010	2011
China	500	23,432	26,675	19,094
United States	10,534	19,174	14,861	10,176
The Netherlands	16,878	24,157	20,753	3,400
Hong Kong			1,056	2,131
France	14,801	15,094	3,002	2,100
Rest	463	69	2,001	1,410
Total	43,175	81,925	68,348	38,312
Source: INDEC				

d) Amenability of the commodity to standardization

The commodity is already standardized by the CCFO. It is proposed to amend the fatty acid profiles with the aim of covering the peanut oil currently traded. It is also proposed to revise the quality parameters of the iodine value and relative density at 20°C.

The proposed amendments are based on solid scientific studies and analytical data, which support the justification for amendment to the Codex Stan-210. The following studies are available:

- *Characterization of the Chemical and Sensory Properties of Argentine Confectionery Peanuts for the Determination of the Designation of Origin. National Institute of Agricultural Technology (INTA), 2007.*
- *Phyto-biological Characterization of Peanuts Produced in the Province of Córdoba - Chemical Composition and Nutritional Attributes of the Product with the Designation of Origin "Córdoba Peanuts" - Second Phase. INTA, 2009.*
- An overview of the different "denominations", from their acidic composition in dissimilar species of vegetable oils. Sunflower and peanut oil. A&G 72, Volume XVIII, No. 3, 676-687, 2008.
- Characterization of the Qualityof Argentine Confectionery Peanuts. Chemical and Nutritional Composition. Fatty Acid Profile. INTA - Argentine Peanut Board - Argentine Peanut Foundation.

These studies specifically show that, in the characterization of the composition and quality parameters of peanut oil, it is noted that, in many cases, the value ranges of the different parameters fall outside Codex Standards, thus supporting the proposed request for amendment.

e) Coverage of the main consumer protection and trade issues by existing or proposed general standards

As mentioned above, the amendment to the Codex Standard for peanut oil will improve the information available to consumers, in addition to ensuring fair practices in the trade of these oils. The parameters to be amended are C16 (Palmitic acid), C18:1 (Oleic acid), C18:2 (Linoleic acid), C20:0 (Arachidonic acid), C20:1 (Eicosenoico acid) and C22:1 (Erucic acid), iodine value and relative density.

f) Number of commodities which would need separate standards indicating whether raw, semi processed or processed

Not relevant.

g) Work already undertaken by other international organizations in this field and/or suggested by the relevant international intergovernmental body(ies).

None known.

5. Relevance in relation to Codex strategic objectives

The proposed amendment to the Codex Standard (CODEX-Stan 210) is appropriate to Goal 1, Promoting Sound Regulatory Frameworks.

It states that “the CAC will provide essential guidance for its members through the continued development of international standards and guidelines relating to food safety and hygiene, nutrition, labelling, and import/export inspection and certification and quality of the food stuff.”

The Goal stresses that "Codex standards and related texts for food safety and quality, including labelling aspects, should be carefully prepared to reflect global variations. Codex standards for food quality should focus on essential characteristics of products to ensure that they are not overly prescriptive and that the standards are not more trade restrictive than necessary."

The proposed amendment to the Codex Standard (CODEX-Stan 210) will facilitate fair trade in peanut oil, preventing genuine oils from being left out of the Standard.

Work will also be conducted in relation to essential characteristics, taking into account the technical and economic implications for all Codex Members.

6. Information on the relationship between the proposal and existing Codex documents

Codex has developed standards for almost all edible fats and oils, including:

- Codex General Standard for Edible Fats and Oils not Covered by Individual Standards *[CODEX STAN 19-1981 (Rev. 2-1999, as amended in 2009)]*.

- Standard for Olive Oils and Olive Pomace Oils *[CODEX STAN 33-1981 (Rev. 2-2003, as amended in 2009)]*.

- Standard for Named Vegetable Oils *[CODEX STAN 210-1999 (as amended in 2003, 2005, 2011)]*.

- Standard for Named Animal Fats [CODEX STAN 211-1999 (as amended in 2009)].

7. Identification of any Requirement for and Availability of Expert Scientific Advice

None identified.

8. Identification of any Need for Technical Input to the Standard from External Bodies so that this can be Planned for

None identified.

9. Proposed Timeline for Completion of the New Work, Including the Start Date, the Proposed Date for Adoption at Step 5/8, and the Proposed Date for Adoption by the Commission

Approval as new work by the 36th Session of the CAC 2013
Proposed draft amendments considered at step 4 by the 24th Session of CCFO in 2015
Since the matter is minor, the proposed amendment could be sent to the Commission in 2015 for adoption at Step 5/8 with the omission of steps 6 and 7 in the Codex process.

QUALITY ASSESSMENT OF ARGENTINE EDIBLE PEANUTS:

CHEMICAL AND NUTRITIONAL COMPOSITION

FATTY ACIDS PROFILE

(Summary Research Stages I, II and III)

Objective

Analysis of the Argentine peanut production throughout 2007 / 2008 and 2010 crops in order to determine the chemical and nutritional composition of Argentine peanuts (MANI ARGENTINO) ready for export, in its Regular and High Oleic Runner varieties.

This study is part of the Research Project carried out by the Argentine Peanut Foundation (Fundación Maní Argentino) and the Argentine Institute of Agricultural Technology (Instituto Nacional de Tecnología Agropecuaria - INTA), under Agreement CVT No. 20562, signed by both entities. It involves the joint work of Laboratorio de Calidad Nutricional de Granos –LCNG- (Grain Nutritional Quality Lab) of INTA Manfredi Experimental Unit (EEA Manfredi), INTA Castelar, and the Head Laboratory or Cordoba Province (CEProCor).

This CVT annually complements the scientific support for the Designation of Origin “Maní de Cordoba” (Córdoba Peanuts).

Chemical-nutritional composition analyses of the peanut samples were carried out in LCNG of EEA INTA Manfredi. This laboratory is in the process of certifying ISO 17025 compliance, and is taking part in the project “Agricultural Technology Institute High Performance”, one of whose goals is achieving ISO 17025 certification for all INTA labs.

The laboratory also participates in projects subsidized by INTA such as: AETA 283931; AETA 282831; Network of food safety laboratories and Network of agrifood laboratories, which aim at obtaining ISO 17025 certification and setting up a NETWORK of quality and safety laboratories with internal controls -such as inter labs among kindred laboratories within the Institution- and external controls with other national and foreign public Centers of Excellence.

The testing on peanuts is performed under this institutional quality assurance system. For internal control of its methods, the laboratory works with NIST (National Institute of Standards and Technology) standardized reference materials, such as 2387.

Dr. María José Martínez, in charge of this laboratory, is the institutional quality referable officer of the INTA Córdoba Regional Center.

It is important to highlight that CEProCor, head referential Lab of the Province of Cordoba, has ISO 9001 certification for methodology development and testing in chromatography, macro-analysis and microbiology since 2003, its latest recertification dating of April 2011. Additionally, in 2005 the lab achieved ISO 17025 certification for pesticide residue analysis in low fat foods. This implies that the testing on peanuts is performed within the institutional quality assurance system ruled by both standards.

The CEProCor lab annually takes part in inter lab programs of the Argentine Institute of Industrial Technology (Instituto Nacional de Tecnología Industrial, INTI), authorized entity for this kind of activities on a national level.

Dr. Mirtha Nassetta, director of this Lab, worked as FAO consultant on pesticide residues in foods, and is also qualified auditor for ISO 9001 standards, as well as an expert researcher of the Argentine Certification Body.

Materials and Methods

Tests were performed on samples of ready-for-export processed peanuts coming from the processing plants of the Companies associated to the Argentine Peanut Chamber. These samples were collected discriminating between Regular and High Oleic Runner peanut varieties.

Samples analysed for the different research stages were:

Stage	Crop	Number of Samples
Stage I	2007	180 samples
Stage II	2008	39 samples
Stage III	2010	21 samples

Chemical-Nutritional Analysis

The Fatty Matter (%) was extracted in high temperature conditions using a Twisselmann extraction piece of equipment, in compliance with American Oil Chemical Society (AOCS) specifications (1998).

The protein content was determined through Kjeldahl method, using the 6.25 conversion factor, according to the methodology described by Casini et al (2003).

The acidity percentage, as well as the O/L, Iodine Index and TOCO contents were determined following the AOCS official methods and recommended practices (1998).

The Fatty Acids Methyl Esters were prepared according to AOCS (1998). On the other hand, the overall Tocopherols were determined through High Performance Liquid Chromatography (HPLC), in accordance with AOCS (1998).

RESULTS

In the analyses of the different stages, peanuts are characterized by a high content of fatty matter and proteins.

The results obtained indicate that the nutritional composition of peanuts from Cordoba (fats, fiber, protein and carbohydrates) contributes significantly to the daily intake needs recommended in MERCOSUR Res. 46/03. In addition, Cordoba peanuts contain other relevant nutrients in order to keep a good nutritional condition, of nutraceutical importance, such as Omega 6 and 9 fatty acids, vitamin E, folic acid, beta-sitosterol, antioxidants and mineral elements.

The Tables below (Tables 1; 2 and 3) show the Fatty Acid Profile values and the Oleic/Linoleic Ratios (O/L) in the different stages, which indicate that the analyzed samples belong to Regular Runner and High Oleic Runner peanut varieties under study.

Further on, the split results are included in Tables 1; 2 and 3, with detailed sample identification and the values resulting from the analyses for each fatty acid and its O/L ratio. The split results showed the samples from greatest to least O/L ratio.

Table 1. Results Stage I (First Stage)

	Palmitic (C16:0)	Stearic (C18:0)	Oleic (C18:1)	Linoleic (C18:2)	Linolenic (C18:3)	Arachidonic (20:0)	Eicosenoic (20:1)	Behenic (22:0)	Erucic (22:1)	Lignoceric (24:0)	O/L	Iodine Index
Average	7.36	1.52	59.50	22.40	0.13	0.94	2.64	2.99	0.38	2.15	6.05	92.03
Maximum	9.85	2.10	80.90	38.75	0.22	1.15	3.90	5.19	0.66	4.39	19.30	104.00
Minimum	4.67	1.17	40.70	4.19	0.08	0.74	1.66	2.42	0.19	1.77	1.05	77.72
Standard Deviation	1.99	0.16	15.75	13.83	0.04	0.08	0.54	0.41	0.10	0.32	5.92	10.10

Table 2. Results Stage II (Second Stage)

	Palmitic (C:16)	Stearic (C18:0	Oleic (C18:1)	Linoleic (C18:2)	Linolenic (C18:3)	Arachidonic (20:0)	Eicosenoic (20:1)	Behenic (22:0)	Erucic (22:1)	Lignoceric (24:0)	O/L	Iodine Index
Average	6.85	1.72	64.84	17.65	0.1	1.02	2.48	3	0.33	2.01	8.02	88.28
Maximum	9.69	2.92	79.99	37.38	0.14	1.37	3.26	3.44	0.48	2.18	17.67	103.29
Minimum	4.88	1.32	43.05	4.53	0.08	0.85	1.86	2.58	0.22	1.85	1.15	77.18
Desv. Std.	1.9	0.25	14.94	13.29	0.01	0.08	0.42	0.22	0.07	0.06	6.24	9.88

Table 3. Results Stage III (Third Stage)

		Palmitic (C:16)	Stearic (C18:0	Oleic (C18:1)	Linoleic (C18:2)	Linolenic (C18:3)	Arachidonic (20:0)	Eicosenoic (20:1)	Behenic (22:0)	Erucic (22:1)	Lignoceric (24:0)	O/L	Iodine Index
Average	HiO	5.276	1.942	78.165	5.316	0.108	1.079	2.730	2.919	0.389	2.077	15.36	78.58
	RR	7.993	2.070	58.724	22.714	0.110	1.139	2.057	2.998	0.268	1.927	2.71	91.47
Maximum	HiO	5.828	2.249	79.970	7.519	0.165	1.167	3.415	3.405	0.597	2.293	20.43	80.74
	RR	8.866	2.575	66.577	27.992	0.171	1.282	2.259	3.249	0.326	2.101	4.21	96.25
Minimum	HiO	4.962	1.415	74.687	3.911	0.077	0.879	2.347	2.693	0.317	1.882	10.04	77.48
	RR	7.074	1.902	53.909	15.821	0.077	1.100	1.717	2.498	0.202	1.493	1.93	86.32
Standard Deviation	HiO	0.236	0.242	1.675	1.173	0.028	0.083	0.316	0.210	0.080	0.136	3.30	0.90

Split results of the tests at the different Stages

Stage I. Results exposed as per O/L ratio

LAB sample Nº	Treatment	Palmitic (C16:0)	Stearic (C18:0)	Oleic (C18:1)	Linoleic (C18:2)	Linolenic (C18:3)	Arachidonic (20:0)	Eicosenoic (20:1)	Behenic (22:0)	Erucic (22:1)	Lignoceric (24:0)	O/L
G1238	8	4.74	1.55	80.83	4.19	0.08	0.90	2.86	2.44	0.47	1.92	19.30
G1293	63	4.71	1.46	80.87	4.25	0.08	0.89	2.91	2.53	0.38	1.92	19.02
G1312	82	4.78	1.49	80.69	4.44	0.08	0.90	2.84	2.52	0.36	1.89	18.16
G1240	10	4.72	1.54	80.79	4.45	0.10	0.89	2.86	2.45	0.37	1.83	18.15
G1240	10	4.72	1.54	80.78	4.45	0.10	0.89	2.86	2.45	0.36	1.85	18.15
G1281	51	4.67	1.42	80.90	4.46	0.08	0.86	2.92	2.42	0.39	1.87	18.15
G1351	121	4.68	1.53	80.40	4.47	0.09	0.90	3.04	2.53	0.40	1.96	17.97
G1238	8	4.72	1.55	80.47	4.48	0.10	0.90	2.97	2.44	0.47	1.88	17.96
G1251	21	4.79	1.43	80.41	4.56	0.09	0.85	3.02	2.47	0.41	1.96	17.62
G1362	132	4.68	1.40	79.93	4.80	0.08	0.87	3.01	2.68	0.41	2.13	16.66
G1245	15	4.77	1.37	80.28	4.82	0.09	0.84	3.01	2.48	0.40	1.92	16.66
G1359	129	4.90	1.74	78.36	4.76	0.09	1.02	2.64	3.18	0.36	2.93	16.46
G1253	23	4.77	1.39	79.97	5.13	0.10	0.83	3.03	2.44	0.40	1.94	15.59
G1253	23	4.77	1.39	79.99	5.13	0.10	0.83	3.03	2.44	0.40	1.91	15.59
G1365	135	4.92	1.81	79.15	5.14	0.10	1.00	2.88	2.60	0.39	1.99	15.39
G1234	4	4.85	1.43	79.06	5.19	0.11	0.87	3.27	2.62	0.49	2.09	15.23
G1291	61	4.79	1.39	79.96	5.29	0.08	0.85	2.96	2.42	0.39	1.86	15.12
G1283	53	4.82	1.43	79.50	5.33	0.09	0.86	3.12	2.49	0.42	1.93	14.92
G1283	53	4.82	1.43	79.52	5.33	0.09	0.86	3.12	2.49	0.43	1.90	14.92
G1239	9	4.97	1.62	79.37	5.40	0.08	0.94	2.79	2.52	0.36	1.93	14.69
G1259	29	4.87	1.38	79.31	5.63	0.09	0.84	3.03	2.46	0.41	1.97	14.09
G1368	138	5.06	1.59	79.00	5.62	0.09	0.93	2.82	2.53	0.39	1.95	14.05
G1231	1	5.01	1.49	79.04	5.64	0.09	0.90	2.90	2.57	0.39	1.95	14.01
G1296	66	4.99	1.52	78.79	5.66	0.10	0.92	2.99	2.60	0.41	2.02	13.93
G1311	81	4.94	1.64	78.55	5.71	0.10	0.94	3.05	2.62	0.42	2.01	13.77
G1311	81	4.94	1.64	78.55	5.71	0.10	0.94	3.05	2.62	0.42	2.00	13.77
G1255	25	5.06	1.55	78.36	5.70	0.10	0.92	3.10	2.67	0.44	2.08	13.75
G1252	22	4.78	1.19	78.38	5.74	0.12	0.77	3.62	2.67	0.56	2.16	13.66
G1237	7	4.88	1.38	78.54	5.76	0.11	0.86	3.26	2.59	0.50	2.11	13.64
G1233	3	4.91	1.41	78.34	5.83	0.11	0.88	3.28	2.65	0.50	2.08	13.43
G1299	69	5.03	1.59	78.43	5.87	0.09	0.94	2.98	2.61	0.41	2.03	13.36
G1363	133	5.02	1.49	77.94	5.86	0.14	0.88	3.34	2.63	0.52	2.16	13.30
G1286	56	4.94	1.48	78.64	6.08	0.10	0.87	3.05	2.50	0.42	1.90	12.94
G1286	56	4.94	1.48	78.62	6.08	0.10	0.87	3.05	2.50	0.42	1.93	12.94
G1295	65	4.94	1.31	77.86	6.02	0.13	0.81	3.55	2.69	0.55	2.13	12.92
G1295	65	4.94	1.31	77.88	6.03	0.13	0.81	3.55	2.69	0.55	2.10	12.92
G1366	136	5.21	1.73	77.56	6.07	0.13	0.98	3.10	2.65	0.46	2.10	12.79
G1321	91	5.09	1.52	77.69	6.11	0.12	0.91	3.23	2.68	0.48	2.15	12.71
G1353	123	4.92	1.40	77.90	6.24	0.11	0.86	3.29	2.68	0.48	2.10	12.47
G1290	60	5.19	1.80	78.33	6.29	0.09	0.99	2.60	2.54	0.32	1.85	12.45
G1290	60	5.19	1.80	78.33	6.29	0.09	0.99	2.60	2.54	0.32	1.84	12.45
G1289	59	5.07	1.69	78.43	6.30	0.09	0.95	2.75	2.48	0.35	1.88	12.45


G1289	59	5.08	1.69	78.45	6.30	0.09	0.95	2.75	2.48	0.35	1.85	12.45
G1306	76	5.18	1.58	77.64	6.52	0.11	0.93	2.97	2.62	0.42	2.02	11.91
G1308	78	5.14	1.38	77.23	6.49	0.14	0.85	3.40	2.69	0.52	2.15	11.90
G1361	131	5.12	1.66	76.10	6.52	0.11	1.00	3.04	3.20	0.46	2.78	11.66
G1235	5	5.13	1.55	77.89	6.69	0.09	0.91	2.83	2.56	0.37	1.97	11.64
G1266	36	5.24	1.40	76.25	6.62	0.15	0.89	3.59	2.91	0.62	2.31	11.51
G1274	44	5.23	1.62	77.49	6.76	0.10	0.93	2.96	2.58	0.41	1.91	11.47
G1274	44	5.23	1.62	77.47	6.75	0.10	0.93	2.96	2.58	0.41	1.93	11.47
G1316	86	5.06	1.37	76.93	6.75	0.13	0.85	3.46	2.71	0.53	2.19	11.40
G1279	49	5.24	1.75	77.46	6.80	0.09	1.00	2.70	2.62	0.38	1.97	11.39
G1288	58	5.09	1.29	76.83	7.07	0.13	0.80	3.49	2.67	0.52	2.08	10.86
G1288	58	5.10	1.29	76.82	7.08	0.13	0.80	3.49	2.67	0.52	2.08	10.85
G1315	85	5.22	1.49	76.03	7.38	0.14	0.89	3.39	2.72	0.53	2.21	10.31
G1294	64	5.13	1.61	76.87	7.58	0.08	0.97	2.80	2.62	0.35	1.98	10.14
G1282	52	5.26	1.48	76.39	7.63	0.11	0.90	3.06	2.66	0.43	2.07	10.02
G1292	62	5.32	1.21	75.56	7.58	0.16	0.77	3.74	2.77	0.61	2.26	9.97
G1379	149	5.41	1.38	75.46	7.66	0.15	0.84	3.51	2.78	0.57	2.22	9.85
G1276	46	5.43	1.36	75.15	7.82	0.17	0.84	3.56	2.80	0.59	2.27	9.61
G1250	20	5.21	1.17	75.53	7.90	0.18	0.74	3.90	2.56	0.66	2.14	9.56
G1250	20	5.21	1.17	75.50	7.90	0.18	0.74	3.90	2.56	0.66	2.17	9.56
G1335	105	5.37	1.43	74.83	8.35	0.15	0.86	3.45	2.76	0.56	2.23	8.96
G1302	72	5.28	1.54	75.17	8.75	0.10	0.93	3.04	2.73	0.41	2.04	8.59
G1348	118	5.59	1.60	73.49	8.82	0.17	0.94	3.49	2.94	0.60	2.35	8.34
G1377	147	5.41	1.63	75.12	9.10	0.08	0.96	2.77	2.58	0.36	1.98	8.26
G1334	104	5.37	1.59	74.44	9.16	0.10	0.97	3.03	2.81	0.42	2.11	8.13
G1317	87	5.69	1.35	73.51	9.12	0.18	0.84	3.56	2.87	0.58	2.29	8.06
G1370	140	5.42	1.61	74.71	9.62	0.08	0.95	2.71	2.57	0.36	1.96	7.77
G1287	57	5.52	1.52	73.37	10.55	0.10	0.91	2.95	2.68	0.40	1.98	6.95
G1287	57	5.51	1.52	73.35	10.55	0.10	0.91	2.95	2.68	0.40	2.01	6.95
G1376	146	5.70	1.60	72.46	11.05	0.10	0.96	2.90	2.74	0.39	2.09	6.56
G1380	150	6.78	1.44	64.26	17.52	0.17	0.89	3.16	3.00	0.50	2.27	3.67
G1268	38	7.04	1.41	61.75	19.27	0.19	0.90	3.27	3.24	0.52	2.39	3.20
G1374	144	7.25	1.42	60.23	20.76	0.21	0.89	3.18	3.20	0.52	2.31	2.90
G1374	144	7.24	1.42	60.21	20.76	0.21	0.89	3.18	3.20	0.52	2.34	2.90
G1269	39	7.42	1.68	59.39	21.34	0.18	1.00	2.96	3.25	0.48	2.29	2.78
G1378	148	7.47	1.50	59.16	21.71	0.19	0.93	2.98	3.21	0.48	2.34	2.72
G1242	12	6.74	1.43	57.13	20.99	0.12	1.13	2.63	5.03	0.44	4.35	2.72
G1375	145	7.71	1.53	58.00	22.37	0.21	0.96	2.97	3.34	0.51	2.38	2.59
G1284	54	7.30	1.51	59.20	22.95	0.11	0.95	2.57	2.96	0.37	2.07	2.58
G1243	13	7.49	1.45	58.48	22.76	0.17	0.92	2.91	3.07	0.45	2.29	2.57
G1244	14	7.50	1.54	57.51	23.48	0.18	0.96	2.95	3.18	0.45	2.24	2.45
G1244	14	7.50	1.54	57.51	23.49	0.18	0.96	2.95	3.18	0.45	2.24	2.45
G1273	43	7.58	1.29	57.49	23.51	0.20	0.84	3.12	3.10	0.52	2.34	2.45
G1344	114	7.65	1.46	56.94	23.81	0.19	0.92	2.99	3.18	0.49	2.36	2.39
G1340	110	7.74	1.48	56.02	24.68	0.18	0.93	2.95	3.23	0.46	2.32	2.27
G1236	6	7.77	1.32	56.01	25.06	0.21	0.87	2.91	3.05	0.46	2.32	2.23
G1329	99	7.89	1.59	55.10	26.00	0.12	1.00	2.56	3.24	0.34	2.14	2.12
G1329	99	7.89	1.59	55.09	26.00	0.12	1.00	2.56	3.24	0.34	2.15	2.12
G1241	11	8.04	1.40	54.24	26.55	0.18	0.91	2.80	3.12	0.45	2.30	2.04


G1265	35	8.06	1.38	53.80	26.64	0.20	0.90	2.89	3.27	0.46	2.38	2.02
G1365	135	8.09	1.40	53.78	26.67	0.20	0.89	2.88	3.21	0.50	2.36	2.02
G1285	55	7.79	1.42	54.27	26.99	0.14	0.91	2.76	3.12	0.40	2.19	2.01
G1285	55	7.79	1.42	54.27	26.99	0.14	0.91	2.76	3.12	0.40	2.19	2.01
G1354	124	8.15	1.84	54.56	27.24	0.09	1.05	2.03	2.80	0.28	1.95	2.00
G1298	68	7.83	1.41	53.73	27.54	0.15	0.91	2.72	3.11	0.39	2.19	1.95
G1298	68	7.83	1.40	53.71	27.54	0.15	0.91	2.72	3.11	0.39	2.21	1.95
G1278	48	7.95	1.43	53.25	27.37	0.20	0.90	2.94	3.19	0.45	2.28	1.95
G1278	48	7.95	1.43	53.23	27.37	0.20	0.90	2.94	3.19	0.45	2.31	1.94
G1263	33	8.05	1.40	53.19	27.36	0.19	0.90	2.87	3.20	0.45	2.37	1.94
G1347	117	8.13	1.42	52.92	27.40	0.18	0.92	2.84	3.38	0.44	2.34	1.93
G1323	93	8.87	1.85	49.41	31.69	0.10	1.05	1.89	2.91	0.28	1.91	1.56
G1264	34	8.59	1.54	48.60	31.49	0.17	0.96	2.62	3.27	0.40	2.34	1.54
G1275	45	8.90	1.84	48.50	33.06	0.10	1.06	1.78	2.77	0.21	1.77	1.47
G1275	45	8.89	1.84	48.48	33.06	0.09	1.06	1.78	2.77	0.21	1.79	1.47
G1246	16	8.67	1.41	47.73	32.61	0.13	0.96	2.44	3.42	0.34	2.26	1.46
G1338	108	9.39	1.73	46.09	34.56	0.09	1.05	1.84	3.00	0.21	2.01	1.33
G1331	101	8.68	1.33	46.14	34.62	0.15	0.89	2.46	3.17	0.34	2.20	1.33
G1331	101	8.67	1.33	46.12	34.63	0.15	0.89	2.46	3.17	0.34	2.23	1.33
G1326	96	8.91	1.45	45.71	34.33	0.16	0.94	2.51	3.30	0.40	2.28	1.33
G1260	30	8.93	1.51	46.36	35.06	0.08	0.97	2.00	2.97	0.24	1.87	1.32
G1260	30	8.92	1.51	46.34	35.05	0.09	0.97	2.00	2.97	0.24	1.90	1.32
G1232	2	9.51	2.10	45.65	34.67	0.09	1.15	1.69	3.01	0.19	1.92	1.32
G1350	120	9.02	1.51	45.31	35.04	0.17	0.95	2.35	3.13	0.34	2.16	1.29
G1350	120	9.01	1.51	45.31	35.04	0.17	0.95	2.35	3.13	0.34	2.17	1.29
G1314	84	9.48	1.93	45.19	35.42	0.10	1.11	1.68	2.95	0.21	1.90	1.28
G1322	92	9.57	2.03	45.03	35.35	0.09	1.14	1.66	2.94	0.27	1.89	1.27
G1345	115	9.59	1.71	44.99	35.58	0.09	1.04	1.81	2.98	0.22	1.97	1.26
G1346	116	9.60	1.81	44.86	35.66	0.09	1.08	1.78	2.93	0.22	1.95	1.26
G1309	79	9.32	1.63	44.75	35.80	0.09	1.03	1.91	3.24	0.22	1.97	1.25
G1320	90	9.53	1.76	44.53	35.65	0.11	1.06	1.92	3.14	0.25	2.02	1.25
G1339	109	8.99	1.42	44.80	35.99	0.13	0.94	2.19	3.09	0.29	2.16	1.24
G1313	83	9.11	1.70	44.74	36.07	0.11	1.05	1.88	3.11	0.22	2.01	1.24
G1318	88	9.64	1.95	44.21	35.65	0.11	1.14	1.81	3.18	0.24	2.04	1.24
G1247	17	9.28	1.66	44.46	36.05	0.12	1.04	1.97	3.18	0.23	1.99	1.23
G1247	17	9.28	1.66	44.44	36.05	0.12	1.04	1.97	3.18	0.23	2.01	1.23
G1271	41	9.23	1.52	44.46	36.15	0.12	0.98	2.05	3.17	0.26	2.05	1.23
G1305	75	9.39	1.71	44.28	36.02	0.09	1.07	1.90	3.31	0.23	1.99	1.23
G1271	41	9.22	1.52	44.45	36.15	0.12	0.98	2.05	3.16	0.26	2.07	1.23
G1352	122	9.36	1.58	44.32	36.11	0.10	1.01	2.00	3.13	0.32	2.05	1.23
G1270	40	9.29	1.56	44.41	36.36	0.10	0.99	1.96	3.07	0.27	1.97	1.22
G1364	134	9.56	1.67	44.21	36.28	0.10	1.02	1.88	3.00	0.27	1.99	1.22
G1372	142	9.12	1.35	44.08	36.44	0.13	0.91	2.28	3.13	0.33	2.21	1.21
G1310	80	9.39	1.66	43.99	36.38	0.09	1.04	1.92	3.26	0.23	2.02	1.21
G1371	141	9.69	1.63	44.01	36.51	0.09	1.02	1.83	3.00	0.24	1.95	1.21
G1336	106	9.54	1.64	43.97	36.54	0.09	1.03	1.89	3.07	0.22	1.99	1.20
G1262	32	9.41	1.60	43.98	36.66	0.10	0.99	1.97	2.98	0.26	2.03	1.20
G1360	130	9.11	1.56	42.26	35.24	0.19	1.05	2.29	4.42	0.34	3.52	1.20
G1328	98	9.26	1.52	43.92	36.63	0.11	0.98	2.05	3.11	0.30	2.10	1.20


G1373	143	9.14	1.50	43.86	36.76	0.11	0.97	2.10	3.11	0.30	2.13	1.19
G1332	102	9.81	1.69	43.71	36.65	0.09	1.05	1.80	3.04	0.21	1.93	1.19
G1248	18	9.40	1.58	43.60	36.65	0.12	1.00	2.06	3.18	0.28	2.11	1.19
G1256	26	9.36	1.63	44.04	37.23	0.10	0.97	1.84	2.74	0.23	1.83	1.18
G1256	26	9.35	1.63	44.03	37.24	0.10	0.97	1.84	2.74	0.23	1.85	1.18
G1355	125	9.74	1.79	43.49	36.80	0.10	1.06	1.82	2.97	0.25	1.97	1.18
G1280	50	9.47	1.60	43.49	36.98	0.12	1.00	2.02	3.07	0.26	2.00	1.18
G1280	50	9.46	1.60	43.46	36.98	0.12	1.00	2.02	3.07	0.26	2.02	1.18
G1333	103	9.74	1.66	43.36	37.03	0.09	1.03	1.84	3.03	0.21	1.98	1.17
G1343	113	9.33	1.24	43.01	36.85	0.19	0.87	2.43	3.30	0.37	2.39	1.17
G1249	19	9.42	1.60	43.35	37.18	0.10	1.00	1.96	3.08	0.26	2.01	1.17
G1349	119	9.24	1.59	43.46	37.33	0.10	1.00	1.99	3.02	0.24	2.01	1.16
G1356	126	9.70	1.72	43.22	37.15	0.10	1.04	1.83	2.99	0.25	1.97	1.16
G1307	77	9.67	1.48	43.10	37.06	0.11	0.97	2.06	3.20	0.27	2.07	1.16
G1319	89	9.45	1.79	42.25	36.43	0.15	1.12	2.32	3.77	0.36	2.34	1.16
G1304	74	9.55	1.41	42.95	37.13	0.12	0.95	2.14	3.31	0.27	2.13	1.16
G1369	139	9.23	1.31	42.83	37.07	0.19	0.89	2.44	3.30	0.37	2.35	1.16
G1301	71	9.23	1.44	42.79	37.24	0.16	0.96	2.24	3.33	0.31	2.28	1.15
G1358	128	8.85	1.48	40.92	35.62	0.13	1.11	2.01	5.19	0.27	4.39	1.15
G1303	73	9.68	1.49	42.81	37.47	0.10	0.98	2.00	3.15	0.26	2.03	1.14
G1341	111	9.38	1.17	42.55	37.29	0.20	0.84	2.47	3.32	0.37	2.38	1.14
G1324	94	9.46	1.43	42.15	37.12	0.20	0.93	2.46	3.45	0.40	2.38	1.14
G1342	112	9.31	1.37	42.54	37.69	0.14	0.92	2.25	3.22	0.32	2.22	1.13
G1367	137	9.50	1.43	42.46	37.70	0.14	0.95	2.16	3.20	0.30	2.15	1.13
G1330	100	9.37	1.35	42.54	37.83	0.13	0.92	2.20	3.17	0.31	2.16	1.12
G1272	42	9.36	1.37	42.47	37.78	0.15	0.92	2.19	3.23	0.32	2.17	1.12
G1327	97	9.47	1.18	42.01	37.43	0.22	0.83	2.58	3.40	0.41	2.44	1.12
G1337	107	9.09	1.20	42.20	37.65	0.21	0.84	2.56	3.38	0.39	2.45	1.12
G1277	47	9.80	1.36	41.83	37.49	0.18	0.91	2.36	3.41	0.37	2.29	1.12
G1297	67	9.54	1.54	42.13	37.77	0.13	0.99	2.14	3.29	0.32	2.13	1.12
G1267	37	9.84	1.47	40.99	37.83	0.19	0.96	2.37	3.64	0.33	2.36	1.08
G1261	31	9.73	1.47	41.02	37.86	0.19	0.96	2.42	3.61	0.35	2.37	1.08
G1267	37	9.85	1.47	40.99	37.84	0.19	0.96	2.37	3.64	0.33	2.33	1.08
G1258	28	9.66	1.43	40.96	37.97	0.20	0.94	2.46	3.60	0.37	2.38	1.08
G1254	24	9.73	1.43	40.90	37.93	0.20	0.94	2.46	3.60	0.37	2.40	1.08
G1357	127	9.48	1.61	40.78	38.07	0.20	0.99	2.47	3.54	0.39	2.44	1.07
G1257	27	9.61	1.43	40.94	38.33	0.20	0.94	2.43	3.51	0.34	2.24	1.07
G1257	27	9.60	1.43	40.93	38.33	0.20	0.94	2.43	3.51	0.34	2.26	1.07
G1325	95	9.84	1.34	40.70	38.61	0.17	0.89	2.39	3.34	0.38	2.30	1.05
G1300	70	9.59	1.45	40.80	38.75	0.15	0.97	2.28	3.45	0.33	2.22	1.05
Average		7.36	1.52	59.50	22.40	0.13	0.94	2.64	2.99	0.38	2.15	6.05
Maximum		9.85	2.10	80.90	38.75	0.22	1.15	3.90	5.19	0.66	4.39	19.30
Minimum		4.67	1.17	40.70	4.19	0.08	0.74	1.66	2.42	0.19	1.77	1.05
Standard Deviation		1.99	0.16	15.75	13.83	0.04	0.08	0.54	0.41	0.10	0.32	5.92

Stage II. Results exposed as per Variety and O/L ratio

High Oleic Variety

LAB Sample Nº	Treatment	Palmitic (C16:0)	Stearic (C18:0)	Oleic (C18:1)	Linoleic (C18:2)	Linolenic (C18:3)	Arachidonic (20:0)	Eicosenoic (20:1)	Behenic (22:0)	Erucic (22:1)	Lignoceric (24:0)	O/L
I696	Hi Oleic	5.05	1.61	79.99	4.53	0.09	0.96	2.75	2.67	0.36	1.98	17.67
I695	Hi Oleic	5.09	1.68	79.51	4.84	0.09	0.99	2.74	2.72	0.36	1.98	16.44
I731	Hi Oleic	5.39	2.92	78.08	4.76	0.08	1.37	2.27	2.83	0.27	2.02	16.41
I700	Hi Oleic	5.04	2.05	78.59	5.02	0.09	1.13	2.74	2.93	0.36	2.05	15.65
I730	Hi Oleic	5.05	1.81	79.51	5.24	0.08	1.02	2.54	2.58	0.31	1.85	15.17
I707	Hi Oleic	4.88	1.45	78.79	5.23	0.11	0.88	3.26	2.82	0.48	2.09	15.08
I709	Hi Oleic	5.08	1.74	78.70	5.31	0.09	1.00	2.86	2.81	0.39	2.02	14.81
I713	Hi Oleic	5.16	1.40	78.79	5.47	0.10	0.87	2.97	2.82	0.41	2.01	14.40
I716	Hi Oleic	5.12	1.55	78.54	5.47	0.10	0.94	2.98	2.85	0.42	2.03	14.36
I717	Hi Oleic	5.01	1.63	78.56	5.54	0.10	0.97	2.95	2.82	0.41	2.02	14.18
I720	Hi Oleic	5.15	1.89	78.20	5.63	0.09	1.08	2.68	2.93	0.35	2.01	13.89
I721	Hi Oleic	5.19	1.88	78.10	5.74	0.09	1.07	2.67	2.92	0.34	2.00	13.60
I714	Hi Oleic	5.22	1.32	78.19	5.96	0.10	0.85	3.08	2.81	0.43	2.04	13.13
I729	Hi Oleic	5.18	1.65	77.98	6.17	0.09	0.99	2.74	2.86	0.35	2.00	12.64
I703	Hi Oleic	5.21	1.72	77.56	6.29	0.09	1.01	2.82	2.85	0.38	2.05	12.32
I710	Hi Oleic	5.23	1.75	77.08	6.58	0.10	1.00	2.91	2.87	0.42	2.06	11.71
I704	Hi Oleic	5.28	1.79	77.19	6.62	0.09	1.03	2.79	2.82	0.37	2.03	11.67
I708	Hi Oleic	5.07	1.42	77.29	6.64	0.11	0.87	3.19	2.85	0.47	2.09	11.64
I723	Hi Oleic	5.32	1.67	77.17	6.95	0.09	0.98	2.73	2.77	0.36	1.96	11.10
I699	Hi Oleic	5.36	2.02	76.42	6.99	0.10	1.12	2.69	2.91	0.35	2.04	10.93
Average		5.15	1.75	78.21	5.75	0.09	1.01	2.82	2.82	0.38	2.02	13.84
Maximum		5.39	2.92	79.99	6.99	0.11	1.37	3.26	2.93	0.48	2.09	17.67
Minimum		4.88	1.32	76.42	4.53	0.08	0.85	2.27	2.58	0.27	1.85	10.93
Standard Deviation		0.13	0.34	0.91	0.74	0.01	0.12	0.22	0.08	0.05	0.05	1.93

Regular Runner Variety

LAB sample Nº	Treatment	Palmitic (C16:0)	Stearic (C18:0)	Oleic (C18:1)	Linoleic (C18:2)	Linolenic (C18:3)	Arachidonic (20:0)	Eicosenoic (20:1)	Behenic (22:0)	Erucic (22:1)	Lignoceric (24:0)	O/L
I722	Regular Runner	6.57	1.74	67.14	16.13	0.09	1.02	2.34	2.79	0.29	1.90	4.16
I728	Regular Runner	6.80	1.63	64.97	17.45	0.10	0.99	2.57	3.07	0.35	2.07	3.72
I694	Regular Runner	7.05	1.83	63.12	19.04	0.10	1.07	2.40	3.09	0.31	2.00	3.31
I693	Regular Runner	7.20	1.83	62.60	19.52	0.09	1.06	2.37	3.04	0.31	1.99	3.21
I701	Regular Runner	8.03	1.78	54.91	26.32	0.11	1.06	2.30	3.17	0.30	2.03	2.09
I702	Regular Runner	8.43	1.79	51.56	29.56	0.10	1.07	2.13	3.13	0.27	1.97	1.74
I711	Regular Runner	8.70	1.66	51.23	29.88	0.10	1.02	2.09	3.10	0.25	1.97	1.71
I715	Regular Runner	8.87	1.78	49.28	31.69	0.09	1.07	1.93	3.10	0.23	1.96	1.56
I705	Regular Runner	8.87	1.50	47.78	32.37	0.13	0.97	2.41	3.44	0.34	2.18	1.48
I726	Regular Runner	8.95	1.73	47.78	32.69	0.11	1.05	2.07	3.25	0.27	2.08	1.46
I712	Regular Runner	9.08	1.74	47.75	33.17	0.10	1.05	1.91	3.08	0.23	1.91	1.44
I727	Regular Runner	9.10	1.78	45.74	34.64	0.11	1.07	1.98	3.28	0.26	2.05	1.32
I706	Regular Runner	9.24	1.45	45.41	34.63	0.14	0.95	2.30	3.41	0.32	2.16	1.31
I719	Regular Runner	9.24	1.74	45.23	35.26	0.10	1.06	1.89	3.23	0.25	2.00	1.28
I698	Regular Runner	9.65	1.77	44.90	35.14	0.10	1.08	1.87	3.27	0.22	2.00	1.28
I697	Regular Runner	9.69	1.77	44.60	35.38	0.10	1.08	1.87	3.29	0.22	2.00	1.26
I718	Regular Runner	9.41	1.67	43.85	36.64	0.10	1.04	1.86	3.22	0.24	1.96	1.20
I724	Regular Runner	9.65	1.57	43.50	36.55	0.10	1.02	1.94	3.39	0.24	2.03	1.19
I725	Regular Runner	9.56	1.54	43.05	37.38	0.11	0.99	1.95	3.24	0.24	1.96	1.15
Average		8.63	1.70	50.76	30.18	0.10	1.04	2.11	3.19	0.27	2.01	1.89
Maximum		9.69	1.83	67.14	37.38	0.14	1.08	2.57	3.44	0.35	2.18	4.16
Minimum		6.57	1.45	43.05	16.13	0.09	0.95	1.86	2.79	0.22	1.90	1.15
Standard Deviation		1.02	0.11	7.91	7.02	0.01	0.04	0.23	0.15	0.04	0.07	0.95

Stage III. Results exposed as per Variety and O/L ratio

High Oleic Variety

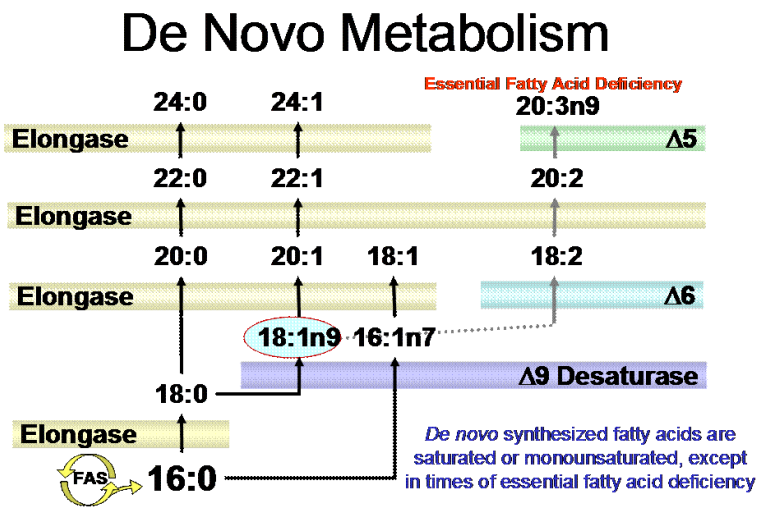
LAB sample Nº	Treatment	Palmitic (C16:0)	Stearic (C18:0)	Oleic (C18:1)	Linoleic (C18:2)	Linolenic (C18:3)	Arachidonic (20:0)	Eicosenoic (20:1)	Behenic (22:0)	Erucic (22:1)	Lignoceric (24:0)	O/L
L313	Hi Oleic	5.09	2.25	79.89	3.91	0.10	1.14	2.54	2.69	0.41	1.99	20.43
L328	Hi Oleic	5.17	2.08	79.97	4.14	0.09	1.10	2.47	2.76	0.32	1.90	19.30
L314	Hi Oleic	5.13	1.94	79.31	4.51	0.16	1.06	2.70	2.78	0.37	2.04	17.58
L321	Hi Oleic	5.28	1.98	79.64	4.56	0.08	1.10	2.35	2.81	0.32	1.88	17.47
L327	Hi Oleic	5.36	2.24	79.10	4.62	0.08	1.17	2.40	2.78	0.32	1.93	17.12
L322	Hi Oleic	5.39	1.97	78.80	4.93	0.09	1.09	2.50	2.89	0.32	2.02	16.00
L320	Hi Oleic	4.96	1.68	78.64	5.25	0.11	0.99	2.94	2.83	0.41	2.19	14.99
L329	Hi Oleic	5.17	2.13	77.79	5.35	0.10	1.14	2.77	2.93	0.41	2.21	14.54
L323	Hi Oleic	5.58	1.96	77.30	5.51	0.10	1.14	2.73	3.23	0.35	2.10	14.03
L311	Hi Oleic	5.18	1.42	76.97	6.06	0.16	0.88	3.41	3.03	0.60	2.29	12.71
L319	Hi Oleic	5.18	1.70	75.88	7.52	0.12	1.00	3.13	2.89	0.44	2.15	10.09
L324	Hi Oleic	5.83	1.95	74.69	7.44	0.11	1.13	2.83	3.40	0.41	2.22	10.04
Average		5.28	1.94	78.16	5.32	0.11	1.08	2.73	2.92	0.39	2.08	15.36
Maximum		5.83	2.25	79.97	7.52	0.16	1.17	3.41	3.40	0.60	2.29	20.43
Minimum		4.96	1.42	74.69	3.91	0.08	0.88	2.35	2.69	0.32	1.88	10.04
Deviation		0.24	0.24	1.67	1.17	0.03	0.08	0.32	0.21	0.08	0.14	3.30

Regular Runner Variety

LAB sample Nº	Treatment	Palmitic (C16:0)	Stearic (C18:0)	Oleic (C18:1)	Linoleic (C18:2)	Linolenic (C18:3)	Arachidonic (20:0)	Eicosenoic (20:1)	Behenic (22:0)	Erucic (22:1)	Lignoceric (24:0)	O/L
L317	Regular Runner	7.07	2.12	66.58	15.82	0.08	1.15	2.11	2.89	0.29	1.90	4.21
L330a	Regular Runner	7.25	2.15	64.02	17.56	0.10	1.15	2.24	3.17	0.33	2.03	3.65
L330b	Regular Runner	7.69	2.06	61.05	20.08	0.10	1.14	2.26	3.25	0.29	2.10	3.04
L325	Regular Runner	7.66	1.90	59.62	22.10	0.10	1.10	2.18	3.07	0.27	2.01	2.70
L326	Regular Runner	8.01	1.96	57.56	23.83	0.09	1.12	2.08	3.11	0.28	1.95	2.42
L315	Regular Runner	8.10	1.92	56.18	24.82	0.16	1.10	2.19	3.14	0.28	2.10	2.26
L318	Regular Runner	8.48	1.91	55.10	26.06	0.10	1.11	1.96	3.07	0.26	1.96	2.11
L312	Regular Runner	8.87	2.57	54.52	26.17	0.09	1.28	1.72	2.80	0.20	1.79	2.08
L316	Regular Runner	8.82	2.03	53.91	27.99	0.17	1.10	1.78	2.50	0.21	1.49	1.93
Average		7.99	2.07	58.72	22.71	0.11	1.14	2.06	3.00	0.27	1.93	2.71
Maximum		8.87	2.57	66.58	27.99	0.17	1.28	2.26	3.25	0.33	2.10	4.21
Minimum		7.07	1.90	53.91	15.82	0.08	1.10	1.72	2.50	0.20	1.49	1.93
Deviation		0.64	0.21	4.44	4.15	0.03	0.06	0.20	0.23	0.04	0.19	0.78

Finally, regarding the request which originates the present report, in connection with the erucic acid of the oils coming from High Oleic peanuts, it should be noted that the synthesis of monounsaturated fatty acids is tied to each individual's metabolism, determined by their DNA,

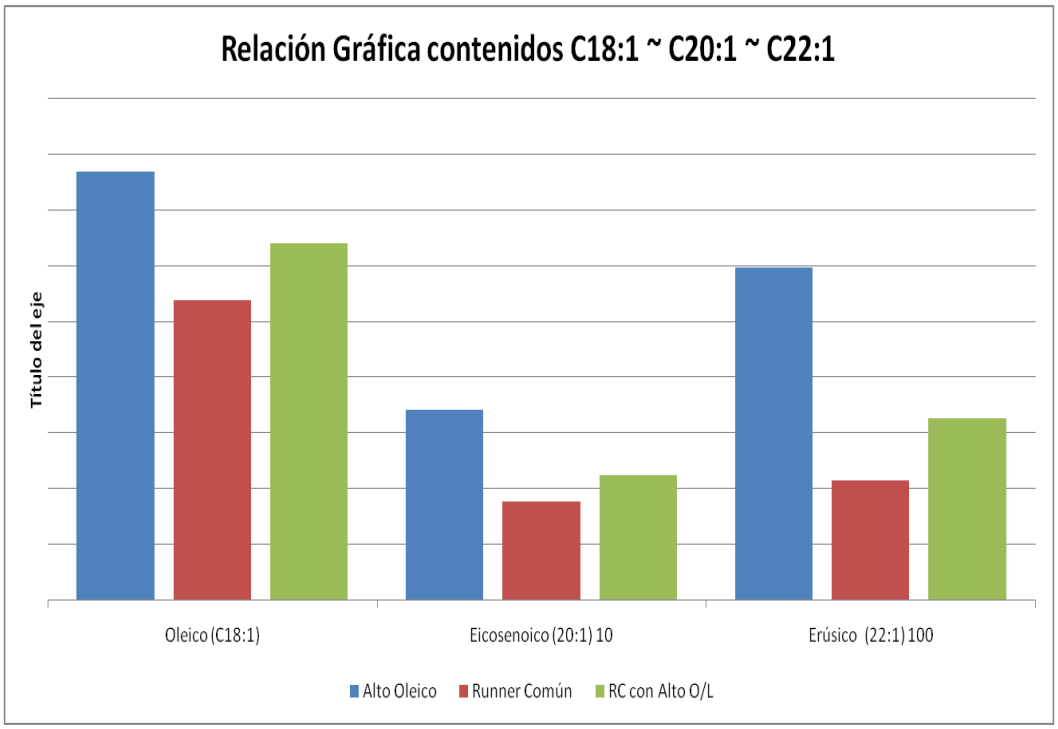
and it is the presence of the ligase enzyme which distinguishes them adding Carbon molecules, as the following graph shows:



Lipogenesis, the chemical reaction through which fatty acids are synthesized, produces the lengthening of the fatty acid chains. This synthesis takes place in the endoplasmic reticulum and is catalyzed by the microsomal elongase enzyme system.

Thus, the content ratio of oleic acid and erucic acid becomes clear from the synthesis of palmitic acid (16:0) elongated to stearic acid (18:0). This long-chain saturated fatty acid (octadecanoic acid) desaturates to oleic acid (18:1) and further desaturates to eicosenoic acid (20:1), involving the ligase enzyme, which adds two atoms of Carbon to the molecule. Through the same metabolic process, Malonyl-CoA (Malonyl coenzyme A) [ligase enzyme] adds two further Carbon atoms, synthesizing erucic acid (22:1), or docosenoic acid, a monounsaturated fatty acid which integrates the so-called “omega 9” fatty acids, due to the position of the double bond (a feature it shares with oleic and eicosenoic acids, among others).

Consequently, we can assert that the fatty acid contents of the different analyzed samples vary according to the metabolism of each individual, the oleic acid content being related to the content of the rest of the lipid composition metabolically derived from it.



For a clearer representation of the relation among the monounsaturated fatty acids contents, the oleic acid content is expressed in its initial notation. Instead, given the significant difference of the contents which may be graphed on the same scale, the content of eicosenoic acid was expressed raised to the power of 10 (real content x 10), and the content of erucic acid was expressed raised to the power of 100 (real content x 100).