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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 of Córdoba Province (CEProCor).

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



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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).



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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.



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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)



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		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



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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



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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



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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



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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



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

High Oleic Variety

LAB Sample N°	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



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Regular Runner Variety

LAB sample №	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)	D/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



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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,

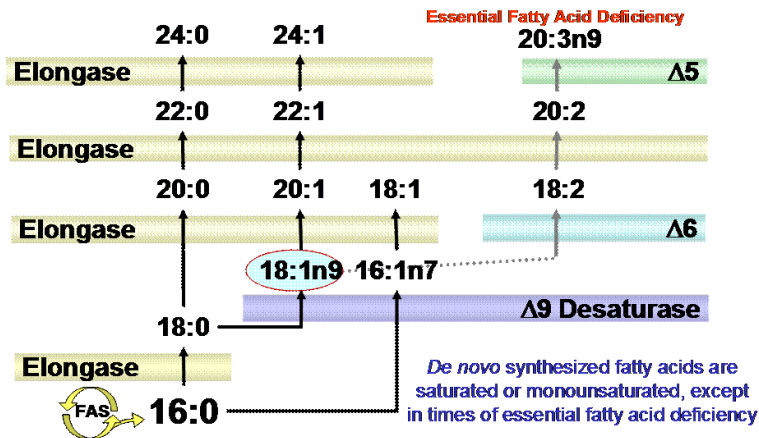


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and it is the presence of the ligase enzyme which distinguishes them adding Carbon molecules, as the following graph shows:

De Novo Metabolism



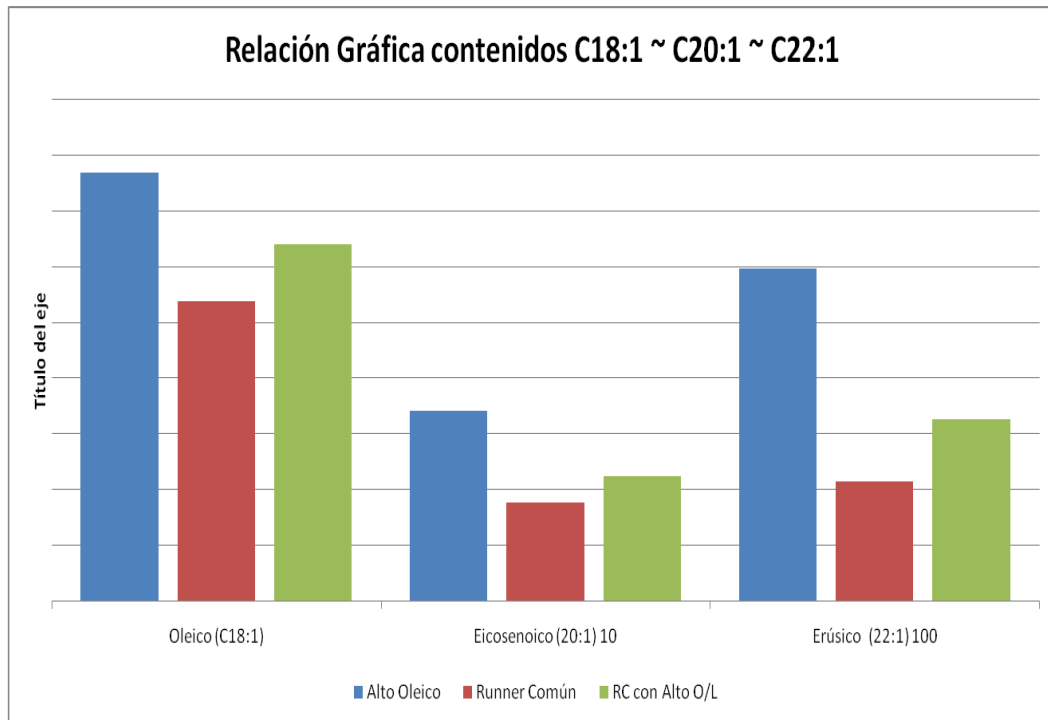
Lipogenesis, the chemical reaction through which fatty acids are synthesized, produces the lengthening of the fatty acid chains. This synthesis takes place in the endoplasmic reticulum and is catalyzed by the microsomal elongase enzyme system.

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.



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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).