

high levels of alpha-linolenic acid (ALA), a plant-derived omega-3 fatty acid, and its positive effect on total cholesterol and low-density lipoprotein (LDL) cholesterol, biomarkers of coronary heart disease.⁹ ALA can be converted, although to a limited extent, to longer-chain PUFA, essential for human health.

Besides maize and wheat, sunflower is the third largest grain crop produced in South Africa. An average of 643 000 tons of sunflower seed were produced annually between 2004 and 2013, and the gross value was approximated to be R1.93 billion per annum.¹⁰ In addition, canola oil represents approximately 6% of the edible oil market in South Africa, and is also an ingredient in a range of products. The

value of products in the edible oil market alone is approximately R400 million. In addition, canola oil is locally produced. Therefore, these accusations that seed oils were toxic and should be avoided caused such concern that our group decided to investigate the validity of such a statement. Three vegetable oils were included in this analysis, of which two were seed oils, i.e. canola and sunflower oil, and the third, olive oil. Their content was compared against that of internationally accepted standards to determine their quality, and to determine whether or not there was any foundation to the statement on the toxicity of South African seed oils. Reported parameters include the fatty acid profile, TFA content, peroxide level

Table 1: The fatty acid content of the oils compared to the respective Codex Standard for Named Vegetable Oils

Descriptor	Olive oil*	Codex Standard	Canola oil*	Codex Standard	Sunflower oil*	Codex Standard
	n = 12		n = 15		n = 7	
C14:0	0.03 ± 0.01	< 0.10	0.08 ± 0.01	ND-0.20	0.10 ± 0.02	ND-0.20
C16:0	10.68 ± 1.63	7.50-20.00	4.03 ± 0.25	2.50-7.00	5.83 ± 0.26	5.00-7.60
C16:1 trans	0.11 ± 0.02	-	0.05 ± 0.01	-	0.23 ± 0.11	-
C16:1	0.79 ± 0.25	0.30-3.50	0.22 ± 0.01	ND-0.60	0.09 ± 0.02	ND-0.30
C18:0	2.04 ± 0.37	0.50-5.00	1.61 ± 0.09	0.80-3.00	3.64 ± 1.03	2.70-6.50
C18:1 trans	0.06 ± 0.03	-	0.08 ± 0.03	-	0.10 ± 0.04	-
C18:1 n-9	74.87 ± 4.14	55.00-83.00	60.20 ± 1.68	51.00-70.00	29.40 ± 3.62	14.00-39.40
C18:1 n-11	1.39 ± 1.29	-	2.79 ± 0.15	-	0.35 ± 0.18	-
C18:2 trans	0.03 ± 0.01	-	0.08 ± 0.04	-	0.02 ± 0.01	-
C18:2 n-6	8.49 ± 2.38	3.50-21.00	19.02 ± 1.87	15.00-30.00	58.66 ± 2.56	48.30-74.00
C18:3 n-3	0.65 ± 0.08	< 1.50	8.94 ± 0.72	5.00-14.00	0.14 ± 0.06	ND-0.30
C20:0	0.29 ± 0.04	< 0.80	0.37 ± 0.05	0.20-1.20	0.22 ± 0.05	0.10-0.50
C20:1 trans	0.00 ± 0.01	-	0.01 ± 0.01	-	0.00 ± 0.00	-
C20:1	0.27 ± 0.04	-	1.05 ± 0.09	0.10-4.30	0.14 ± 0.02	ND-0.30
C20:2	0.01 ± 0.01	-	0.06 ± 0.01	ND-0.10	0.04 ± 0.02	ND
C20:4 n-6	0.10 ± 0.02	-	0.01 ± 0.01	-	0.59 ± 0.27	-
C22:0	0.00 ± 0.00	< 0.30	0.28 ± 0.03	ND-0.60	0.00 ± 0.00	0.30-1.50
C22:1 trans	0.00 ± 0.00	-	0.01 ± 0.02	-	0.03 ± 0.07	-
C22:1	0.01 ± 0.01	-	0.09 ± 0.14	ND-2.00	0.01 ± 0.01	ND-0.30
C22:2	0.00 ± 0.00	-	0.00 ± 0.00	ND-0.10	0.01 ± 0.01	ND-0.30
C20:5 n-3	0.01 ± 0.01	-	0.02 ± 0.01	-	0.01 ± 0.02	-
C22:6 n-3	0.00 ± 0.00	-	0.03 ± 0.03	-	0.00 ± 0.00	-
C24:0	0.02 ± 0.02	< 0.10	0.14 ± 0.01	ND-0.30	0.23 ± 0.09	ND-0.50
C24:1	0.03 ± 0.02	-	0.28 ± 0.10	ND-0.40	0.03 ± 0.01	ND
Total SFA	13.08		6.50		10.10	
Total MUFA	77.50		64.80		30.40	
Total PUFA	9.40		28.70		59.50	
Total TFA	0.20 ± 0.04		0.22 ± 0.07		0.40 ± 0.05	
PUFA:SFA	0.72		4.39		5.91	
MUFA:PUFA	8.24		2.26		0.51	
Total n-6	8.72		19.59		59.35	
Total n-3	0.67		9.04		0.18	
n-6:n-3**	13.02		2.17		329.73	

Codex Standard: Codex Standard for Named Vegetable Oils, MUFA: monounsaturated fatty acid, ND: not detected, PUFA: polyunsaturated fatty acid, SFA: saturated fatty acid, TFA: trans-fatty acid

*The values are expressed as a percentage of total fatty acid

**The n-6:n-3 ratio is calculated as the sum of n-6 fatty acids (18:2 n-6; 18:3 n-6; 20:2 n-6; 20:3 n-6; 20:4 n-6; 22:2 n-6; 22:4 n-6; 22:5 n-6) to the sum of the n-3 fatty acids (18:3 n-3; 20:3 n-3; 20:5 n-3; 22:5 n-3 and 22:6 n-3)