5th INTERNATIONAL MEETING AGRISCIENCE & PRACTICE (ASP 2026)
16th April, 2026, Štip, Republic of North Macedonia

Fatty acid profile of 16 cold-pressed sunflower oils from the region of North Macedonia

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Introduction

Sunflower oil is favorable because of very low level of saturated fatty acids (palmitic and stearic acid) with percentages less than 15%. Abundance of oleic and linoleic acids divide the sunflower oils on two types: high oleic sunflower oils with percentage of oleic acid around 60% and high linoleic sunflower oils with abundance of linoleic acid higher than 80%

Materials and methods

The fatty acid composition of cold pressed sunflower oils was determined using chiral gas chromatography. The esters were prepared using 2 drops of each oil dissolved in 1 ml of heptane. After addition of 50 µL of sodium methylate with concentration of 2 mol/L, the samples were homogenized. The down phase was removed and upper phase was dissolved in 50 µL of 1 M HCl. After second homogenization, the red colour was detected and sodium sulphate anhydride was added in order to remove the water traces. Finally, upper phase was transferred in GC vials and fatty acid methyl esters were analyzed. Fatty acid methyl esters (FAME) were analyzed using a capillary GC equipped with a CP7420 Select FAME column, 100 m x 0.25 mm internal diameter with 0.25 µm film thickness. Analyzes were performed on Agilent 6890 equipped with KAS4Plus and FID. The oven temperature was programmed to increase from 150°C to 240°C with rate of 1.5°C/min and maintained isothermal at 240°C 20 min. The injector and detector temperature were both 260°C. Hydrogen was used as the carrier gas at an average velocity of 25 ml/min. The retention times of separated picks were confirmed by FAME standards.

	C16:0	C18:0	C18:1D9	C18:1D11	C18:2	C22:0
Sunflower oil 1	3.90±0.00	4.38±0.05	1.01±0.05	**83.35±0.22**	**5.61±0.01**	0.74±0.05
Sunflower oil 2	5.31±0.26	5.21±0.23	0.59±0.15	31.15±0.08	55.98±0.57	0.69±0.09
Sunflower oil 3	**7.01±0.01**	4.65±0.11	0.74±0.27	25.90±0.11	60.02±0.07	0.54±0.03
Sunflower oil 4	6.71±0.10	5.45±0.00	0.56±0.22	19.97±0.20	65.61±0.01	0.66±0.00
Sunflower oil 5	6.78±0.00	5.31±0.02	0.57±0.18	**19.89±0.01**	65.91±0.01	0.69±0.00
Sunflower oil 6	6.48±0.07	5.28±0.00	0.85±0.01	24.77±0.03	61.07±0.00	0.66±0.05
Sunflower oil 7	6.53±0.00	5.37±0.04	0.81±0.03	24.87±0.11	60.84±0.14	0.58±0.04
Sunflower oil 8	5.77±0.02	5.66±0.01	0.71±0.06	27.97±0.11	58.67±0.17	0.51±0.01
Sunflower oil 9	6.30±0.00	**6.30±0.03**	0.63±0.03	27.24±0.03	58.19±0.07	0.52±0.00
Sunflower oil 10	**3.89±0.08**	4.65±0.03	1.01±0.05	**81.82±0.31**	**7.02±0.26**	0.71±0.06
Sunflower oil 11	6.54±0.08	5.69±0.05	0.82±0.03	26.06±0.12	59.44±0.13	0.57±0.00
Sunflower oil 12	6.50±0.18	5.38±0.11	0.98±0.02	25.74±0.12	60.49±0.15	0.52±0.05
Sunflower oil 13	6.39±0.15	5.20±0.08	0.56±0.06	26.76±0.41	59.91±0.07	0.51±0.03
Sunflower oil 14	6.00±0.05	5.07±0.00	0.54±0.05	24.35±0.77	63.02±0.20	0.42±0.02
Sunflower oil 15	6.58±0.09	4.50±0.09	1.02±0.04	33.31±0.13	53.46±0.07	0.61±0.05
Sunflower oil 16	6.76±0.04	4.59±0.01	1.24±0.16	33.91±0.00	52.32±0.19	0.56±0.01

Results and discussion

Sunflower oils 1 and 10 had the lowest percentage of palmitic acid (3.90%) and the highest percentage had the sunflower oil 3 (7.10 %). Also, sunflower oil 1 and 10 are high-oleic oils with abundance of 83.35% and 81.82% respectively. The abundance of stearic acid in all 16 samples of sunflower oils was in the range between 4.38% and 6.30%. Behenic acid was present in percentages less than 1% in all 16 samples of sunflower oils. All other samples belongs to the high linolenic type of oils with percentage of linolenic acid between 52.32 and 65.61%.

Conclusion

Sunflower oils 16 and 8 were differentiated by the quantity of C18:1 D9 . The sunflower oil 16 was differentiated because of the highest percentage of C18:1 D9 with value of 1.24±0.16.

References:

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