

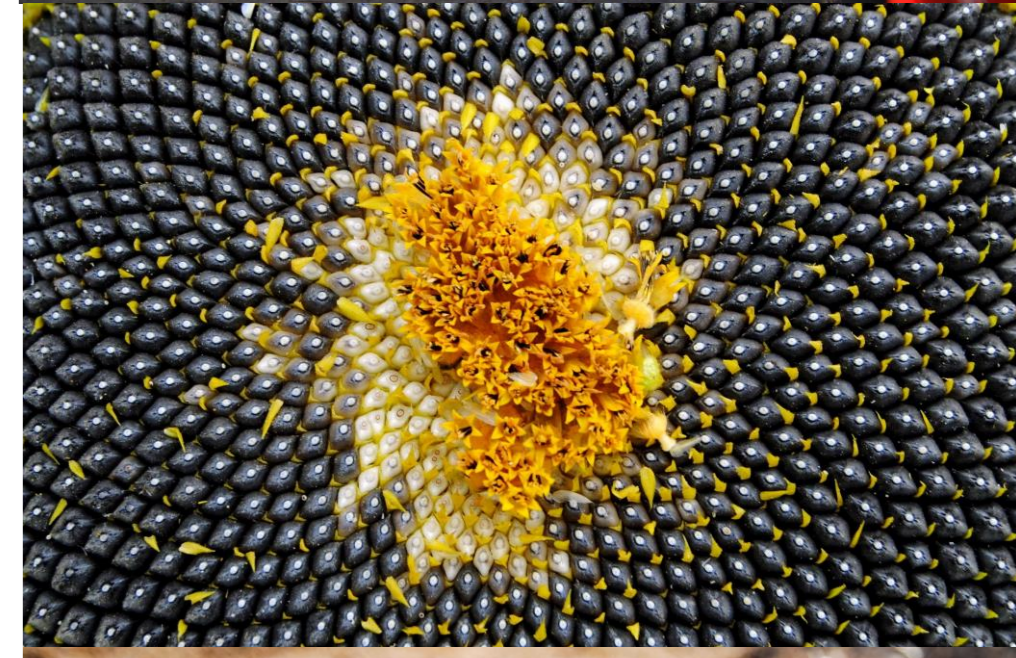
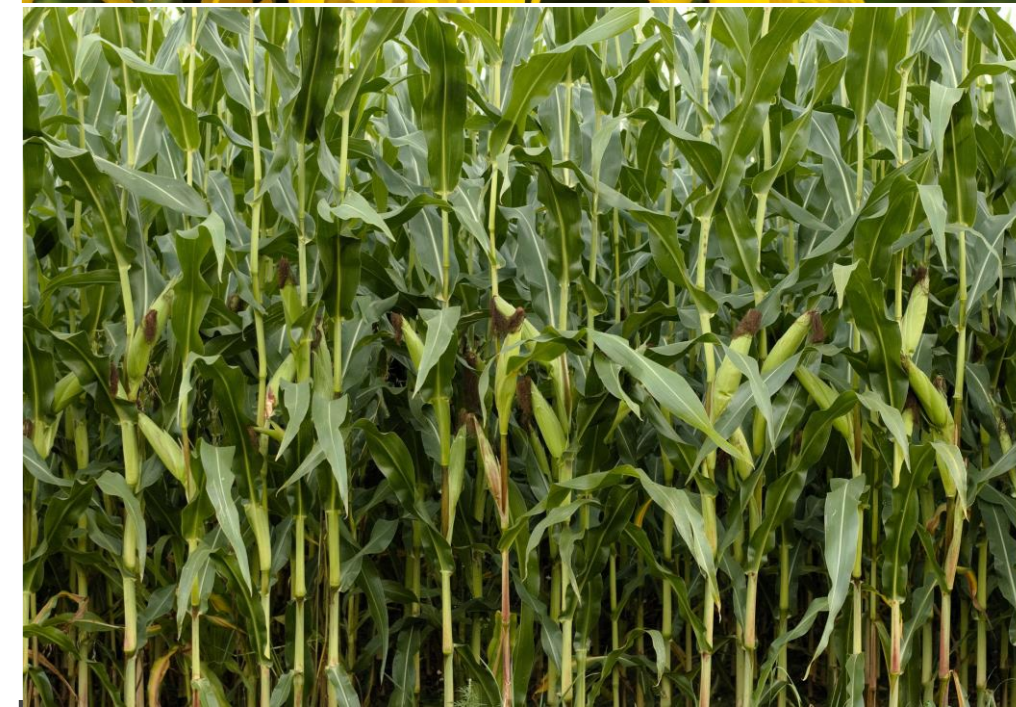
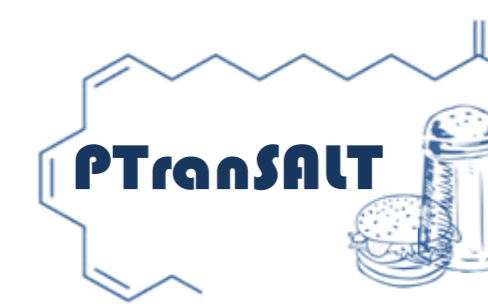
# WORLDWIDE COMPARISON ON TRANS FATTY ACIDS CONTENT IN EDIBLE FATS AND OILS: CURRENT TRENDS AND FUTURE CHALLENGES

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In view of the impact of *trans* fatty acids (TFA) intake on human health, these have been related with multiple cardiovascular risk factors and are associated with higher risk of coronary heart disease.

One of the sources of TFA is partial hydrogenation which converts liquid vegetable oils into solid or semi-solid fats with appropriate melting properties suitable for the production of shortenings and margarines, increasing oxidation stability and the shelf-life of the oil.

Oils and fats, from vegetable and animal origin, are essential ingredients for a variety of food products.

## ANALYTICAL DETERMINATION

Saponification is carried out most of the times with methanolic sodium hydroxide, while for esterification boron trifluoride is the most applied reagent.

Gas chromatography, coupled with flame ionization detector or mass spectrometry, is the most widely used technique to determine fatty acids composition in foods.

The analysis of *cis* and *trans* isomers is better with 100 m long flexible, fused silica capillary columns coated with highly polar cyanopolysiloxane stationary phases (1).

## OCCURRENCE OF TFA IN OILS/FATS

- In Table 1, an overview of TFA contents in oils and fats from different countries is shown.
- One of the main constraints to compare TFA data available in the literature are the units in which those values are presented. Since they can be expressed as % of total fatty acids, % of total fat or even % of fatty acid methyl esters, most of the time it is impossible to compare them.

Table 1. Trans fatty acids content (% of total fatty acids) of vegetable oils, margarines, shortenings, butter and other fats from different countries.

Country	TFA (% of total fatty acids)	Country	TFA (% of total fatty acids)	Country	TFA (% of total fatty acids)	Country	TFA (% of total fatty acids)
Argentina	Margarine: 28.6 Butter: 4.63 Vegetable oils: <0.3	Costa Rica	Margarine: 10.8 – 13.3 Butter: 6.47 Vegetable oils: 0.31 – 2.11	Mexico	Vegetable oil: 0.9 – 2.93 Margarine (spreadable): 18.0 – 28.2 Margarine (stick): 0.24 – 38.9	Switzerland	Semi-solid fats: 0.14 – 28.2 Vegetable oils: 0.04 – 11.4
Austria	Margarine: 0.3 – 3.7 Vegetable oils (cold pressed): 0.0 – 0.1 Vegetable oils (refined): 0.0 – 0.8	Czech Republic	Margarine: 0.1 – 34.8 Butter: 2.4 Cooking fats: 0.2 – 40.7	Pakistan	Margarine (Table): 2.45 – 4.58 Margarine (Bakery): 7.95 – 21.1 Butter: 2.98 – 5.00	Turkey	Margarine: 0 – 39.4 Shortenings: 2.0 – 16.5
Australia	Margarine: 8.01 – 14.5 Butter: 3.44 – 4.75 Lard: 0.73	Germany	Margarine (Fat-reduced): 0.83 – 1.74 Margarine (Vegetable): 0.32 – 4.07 Margarine (Sunflower): 3.33 – 4.88	Portugal	Margarine: 0.4 – 2.5 Fat spread (70%): 0.2 – 5.9 Fat spread (38%): 0.4	United Kingdom	Margarine: 0.16 Fat spread (26-39%): 0.17 – 0.60 Fat spread (41-62%): 0.18 – 0.30
Canada	Margarine of non-hydrogenated vegetable oils: 0.5 – 1.7 Margarine from partially hydrogenated vegetable oils: 17.0 – 42.9	Denmark	Margarine (<20% linoleic acid): 0 – 10.6 Margarine (20-40% linoleic acid): 13.3 – 46.0 Margarine (>40% linoleic acid): 0 – 9.6	Spain	Sunflower oil (non and partially hydrogenated): 18.3 Vegetable oils (non and partially hydrogenated): 0.40 – 10.3 Corn oil (non and partially hydrogenated): 20.5 – 20.8		
						Country (Reference)	Country (Reference)
						Argentina (2)	Mexico (10)
						Austria (3)	Pakistan (11)
						Australia (4)	Portugal (12)
						Canada (5)	Spain (13)
						Costa Rica (6)	Switzerland (14)
						Czech Republic (7)	Turkey (15)
						Denmark (8)	United Kingdom (16)
						Germany (9)	

- According to Table 1, a great variability between countries can be observed for example for margarines.
- The major dietary sources of TFA are food containing partially hydrogenated vegetable oils, namely butter, shortenings and/or margarines, while edible vegetable oils, in general have low contents.
- In conclusion, it is possible to confirm that edible oils and fats processing industry has developed efforts in order to lower TFA amount in this type of foods, namely in the modification of hydrogenation conditions or by developing genetically modified seeds with a better fatty acids profile.

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