

FICHE NUTRITIONNELLE

STRAWBERRY



Apport calorique

38,60 kcal pour 100 g

90,30 g Eau

3,80 g Fibres

6,03 g Glucides

98,90 µg Vitamine B9

54 mg Vitamine C

Raw product



DESCRIPTION

- The strawberry (*Fragaria x ananassa*) belongs to the **Rosaceae family**.
- It is one of the most popular nutritious fruits among the berries ([Mishra, 2014](#)).
- It is **cultivated in almost all countries** of the world ([Mishra, 2014](#)).

PHYSICAL AND ORGANOLEPTIC CHARACTERISTICS

- Strawberry is a very attractive bright **red coloured fruit**, due to the presence of anthocyanins, the main one being pelargonidin-3-glucoside ([Mishra, 2014](#)).
- It is a non-climacteric fruit ([Pech, 2018](#)), whose **colour changes during ripening from green-white to dark red** in about 40 days after anthesis ([Schwieterman, 2014](#)).
- Strawberries are also characterised by their lack of firmness ([Schwieterman, 2014](#)). During ripening, the pH increases while the acidity and firmness of the fruit decreases ([Ornelas-Paz, 2013](#)).
- Their aroma consists mainly of a complex mixture of esters, aldehydes, alcohols and sulphur compounds ([Mishra, 2014](#)). To date, more than 350 volatile compounds have been identified in strawberries, but only a dozen contribute significantly to the aroma of this fruit, especially furaneol (4-hydroxy-2,5-dimethyl-3-(2H)-furanone) ([Song, 2016](#); [Yan, 2018](#)).
- Esters, such as methyl and ethyl butanoates and hexanoates, are also thought to be important contributors to the aroma of this fruit ([Mishra, 2014](#); [Cruz-Rus, 2017](#)).
- Linalool (monoterpenol) has been associated with a floral and sweet aroma while furanol while its methoxylated derivative mesifuran (2,5-dimethyl-4-methoxy-3 (2 H)-furanone) (furanones) is thought to be responsible for the fruity and caramel aromas. Other key compounds such as γ -decalactone and γ -dodecalactone, contributing to fresh peach aroma, have been associated with the perception of increased sweetness in strawberries ([Cruz-Rus, 2017](#); [Ulrich, 2016](#); [Yan, 2018](#)).
- However, there are differences in aroma among the multiple cultivars ([Mishra, 2014](#)).
- The ripening of strawberries leads to accumulation of several sugars and organic acids in addition to the volatile compounds that constitute their aroma ([Ménager, 2004](#); [Nunes, 2006](#); [Kafkas, 2007](#); [Schwieterman, 2014](#)).
- The minor acidic note is due to the presence, to a greater or lesser degree, of organic acids, mainly citric and malic acids ([Mikulic-Petkovsek, 2012](#)). The main organic acids tend to increase irregularly during strawberry ripening ([Ornelas-Paz, 2013](#)).

COMPOSITION CHARACTERISTICS (EXCLUDING MACRONUTRIENTS, VITAMINS AND MINERALS)

- A common denominator in the pathogenesis of most chronic inflammatory diseases is the involvement of oxidative stress, related to the production of ROS ([Gasparrini, 2017](#)). **Several in vitro and in vivo studies have reported the effects of strawberry extracts on the suppression of oxidative stress and the inflammatory process.** The polyphenols contained in strawberries are believed to be responsible for these beneficial properties ([Battino, 2020](#)).
- Epidemiological and clinical studies show that acute consumption appears to improve postprandial glycemic response. At the same time, **prolonged intake is reported to improve plasma lipid profile, promoting cardiovascular health**, especially in those at increased risk of metabolic syndrome ([Forbes-Hernandez, 2016](#)).
- To explain their beneficial effects, much attention has been paid in the past to the antioxidant properties of strawberry polyphenols. However, recent research has shown that their biological and functional activities are related not only to antioxidant capacity but also to the modulation of many cellular pathways involved in metabolism, survival, proliferation and antioxidant defences ([Forbes-Hernandez, 2016](#)).

- Generally speaking, phenolic acids (hydroxycinnamic and hydroxybenzoic acids) are in the majority in strawberries, followed by anthocyanins, flavonols and flavan-3-ols ([Seeram, 2006](#); [Kosińska, 2013](#); [Nowicka, 2019](#)).
- Among the phenolic acids, ellagic acid and coumaric acid derivatives are generally predominant. While pelargonidin-3-glucoside is the major anthocyanin in strawberry, the presence of cyanidin-3-glucoside and pelargonidin-3-acetylglucoside has also been reported ([Bakker, 1994](#); [Lopes-da-Silva, 2002](#)).
- Other compounds usually include quercetin and kampferol derivatives (flavonols), as well as catechin and procyanidins (flavan-3-ols). The latter compounds may also be present in large amounts but in condensed form (proanthocyanidins) ([Enomoto, 2019](#)).

COMPOSITION ET ANALYSE NUTRITIONNELLE

RAW

The following values are approximate and depend on variety, season, ripeness, cultivation conditions, etc. Strawberries are **low in energy*** as they provide an average of **38.60 calories (kcal)** per 100 g, i.e. **162 kJ**. According to the Ciqua 2020 table, strawberries are the second lowest calorie fruit after lemons.

COMPOSITION TABLES

For each nutrient, the tables provide information on the content, the minimum and maximum values and the percentage of the [Dietary Reference Values](#) (DRVs) per 100 g net of strawberries.

*Regulation (EC) No 1924/2006 of the European Parliament and of the Council of 20 December 2006 on nutrition and health claims made on foods.

MACRONUTRIMENTS

Valeurs

Constituant (g)	Teneur moyenne	Min-Max pour 100 g	% VNR
Eau	90,30	87 - 92,60	-
Fibres	3,80	1,10 - NC	-
Glucides	6,03	3,83 - 7,30	2,32
<i>dont Sucres</i>	5,60	4,57 - NC	6,22
Lipides	< 0,50	0,13 - 0,80	-
<i>dont Acides Gras Saturés</i>	< 0,01	NC - 0,066	-
Protéines	0,63	0,10 - 1,25	1,26

Sources

Constituant (g)	Quantité	Min-Max	% VNR
Eau	Ciqua 2020 (valeur issue des analyses Ciqua-Aprifel 2017)	-	-

Constituant (g)	Quantité	Min-Max	% VNR
Fibres	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	-
Glucides	Ciqual 2020	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
<i>dont Sucres</i>	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Lipides	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
<i>dont Acides Gras Saturés</i>	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Protéines	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011

Zoom on carbohydrates

- The energy of strawberries comes mainly from their carbohydrates, at 6.03 g per 100 g.
- This amount is well below the average content in fresh fruit: about 11.31 g per 100 g.
- These carbohydrates are mainly fructose (3.30 g per 100 g) and glucose (2.30 g per 100 g).

Zoom on fibres

- Strawberries are a **source of fibre*** as they contain more than 3 g of fibre per 100 g, i.e. 3.80 g per 100 g.
- They contain more than the average content found in fresh fruit (2.77 g per 100 g).

Zoom on proteins

- The protein content of strawberries (0.63 g per 100 g) is lower than the average quantity found in fresh fruit: 0.93 g per 100 g.

Zoom on lipids

- Strawberries **are fat-free*** as they contain less than 0.5 g of fat per 100 g.

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MINÉRAUX ET OLIGO-ÉLÉMENTS

Valeurs

Constituant	Teneur moyenne	Min-Max pour 100 g	% VNR
Calcium (mg)	18	8 - 31,60	2,25
Chlorure (mg)	< 20	-	-
Cuivre (mg)	0,02	0,013 - 0,15	2
Fer (mg)	0,19	0,11 - 0,80	1,36
Iode (µg)	< 20	0,05 - NC	-
Magnésium (mg)	12	8 - 18	3,20
Manganèse (mg)	0,26	0,14 - 0,75	13
Phosphore (mg)	23	9 - 39	3,29
Potassium (mg)	140	77 - 344	7
Sélénium (µg)	< 20	0,20 - NC	-
Sodium (mg)	< 5	0 - NC	-
Zinc (mg)	0,11	0,04 - 0,59	1,10

Sources

Constituant	Quantité	Min-Max	% VNR
Calcium (mg)	Ciqua 2020 (valeur issue des analyses Ciqua-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Chlorure (mg)	Ciqua 2020 (valeur issue des analyses Ciqua-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Cuivre (mg)	Ciqua 2020 (valeur issue des analyses Ciqua-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Fer (mg)	Ciqua 2020 (valeur issue des analyses Ciqua-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011

Constituant	Quantité	Min-Max	% VNR
Iode (µg)	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Magnésium (mg)	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Manganèse (mg)	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Phosphore (mg)	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Potassium (mg)	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Sélénium (µg)	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Sodium (mg)	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	-
Zinc (mg)	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011

Zoom on minerals and trace elements

- Strawberries contain a significant amount of **manganese** equivalent to 13% of DRVs, i.e. 0.26 mg per 100 g.
- The other minerals and trace elements are present in quantities representing less than 8% of DRVs.

VITAMINES

Valeurs

Constituant	Teneur moyenne	Min-Max pour 100 g	% VNR
Provitamine A Béta-carotène (µg)	< 5	3 - 12	-

Constituant	Teneur moyenne	Min-Max pour 100 g	% VNR
Équivalent Vitamine A (µg)	< 0,83	0,50 - 2	-
Vitamine B1 (mg)	< 0,015	0,007 - 0,044	-
Vitamine B2 (mg)	< 0,01	0,007 - 0,05	-
Vitamine B3 (mg)	0,21	0,19 - 1,11	1,31
Vitamine B5 (mg)	0,13	0,071 - 0,34	2,17
Vitamine B6 (mg)	0,04	0,026 - 0,08	2,86
Vitamine B9 (µg)	98,9	19 - 133	49,45
Vitamine C (mg)	54	52,50 - 76	67,50
Vitamine E (mg)	0,30	0,19 - 0,48	2,50
Vitamine K1 (µg)	< 0,80	NC - 20	-

Sources

Constituant	Quantité	Min-Max	% VNR
Provitamine A Béta-carotène (µg)	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	-
Équivalent Vitamine A (µg)	Calcul à partir de la valeur Provitamine A Béta-carotène*	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Vitamine B1 (mg)	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Vitamine B2 (mg)	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Vitamine B3 (mg)	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Vitamine B5 (mg)	Ciqual 2020 (valeur issue des analyses Ciqual-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011

Constituant	Quantité	Min-Max	% VNR
Vitamine B6 (mg)	Ciqua 2020 (valeur issue des analyses Ciqua-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Vitamine B9 (µg)	Ciqua 2020 (valeur issue des analyses Ciqua-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Vitamine C (mg)	Ciqua 2020 (valeur issue des analyses Ciqua-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Vitamine E (mg)	Ciqua 2020 (valeur issue des analyses Ciqua-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011
Vitamine K1 (µg)	Ciqua 2020 (valeur issue des analyses Ciqua-Aprifel 2017)	-	Règlement (UE) N°1169/2011 du parlement Européen et du conseil du 25 octobre 2011

Zoom on vitamins

- Strawberries are **high in**:
 - **vitamin C**, as they provide the equivalent of 67.50% of DRVs, i.e. 54 mg per 100 g;
 - **vitamin B9**, as they provide the equivalent of 49.45% of DRVs, i.e. 98.90 µg per 100 g. According to the Ciqua 2020 table, strawberries are the fruit with the highest vitamin B9 content after passion fruit.
- The other vitamins are present in quantities representing less than 3% of DRVs.

*Calculation made: Beta Carotene / 6 + retinol

POLYPHÉNOLS

Valeurs

Constituant (g)	Teneur moyenne	Min-Max pour 100 g
Flavonoïdes (mg)	47,43	-
<i>dont Flavonols (mg)</i>	3,99	-
<i>dont Flavanols (mg)</i>	18,48	-
<i>dont Anthocyanes (mg)</i>	24,95	-
Acides Phénoliques (mg)	2,44	-

Constituant (g)	Teneur moyenne	Min-Max pour 100 g
<i>dont Acides Hydroxybenzoïques (mg)</i>	1,04	-
<i>dont Acides Hydroxycinnamiques (mg)</i>	1,40	-
Polyphénols totaux	49,87	-

Sources

Constituant (g)	Quantité	Min-Max
Flavonoïdes	Etude CTIFL-Aprifel 2017-2018 Méthode utilisée : Chromatographie	-
<i>dont Flavonols</i>	Etude CTIFL-Aprifel 2017-2018 Méthode utilisée : Chromatographie	-
<i>dont Flavanols</i>	Etude CTIFL-Aprifel 2017-2018 Méthode utilisée : Chromatographie	-
<i>dont Anthocyanes</i>	Etude CTIFL-Aprifel 2017-2018 Méthode utilisée : Chromatographie	-
Acides Phénoliques	Etude CTIFL-Aprifel 2017-2018 Méthode utilisée : Chromatographie	-
<i>dont Acides Hydroxybenzoïques</i>	Etude CTIFL-Aprifel 2017-2018 Méthode utilisée : Chromatographie	-
<i>dont Acides Hydroxycinnamiques</i>	Etude CTIFL-Aprifel 2017-2018 Méthode utilisée : Chromatographie	-
Polyphénols totaux	Etude CTIFL-Aprifel 2017-2018 Méthode utilisée : Chromatographie	-

Zoom on polyphenols

- Polyphenols are substances with an antioxidant effect.
- Strawberries present a notable quantity of polyphenols constituted with 95% of flavonoids.
- The polyphenols most present in strawberries are **anthocyanins** (50% of total polyphenols), followed closely by **flavanols** (37% of total polyphenols).

ALLÉGATIONS NUTRITIONNELLES ET DE SANTÉ

ALLÉGATIONS NUTRITIONNELLES ET DE SANTÉ RAW

According to the definitions of nutrition claims as set out in Regulation (EC) No 1924/2006 on nutrition and health claims, and in view of the composition of strawberries, the following claims may be used:

NUTRITION CLAIMS OF STRAWBERRIES

- **Low in energy** (100 g of strawberries provide less than 40 kcal)
- **High in vitamin C** (100 g of strawberries provide the equivalent of more than 30% of DRVs)
- **High in vitamin B9** (100 g of strawberries provide the equivalent of more than 30% of DRVs)
- **Source of fibre** (100 g of strawberries provide more than 3 g of fibre).
- **Fat-free** (100 g of strawberries contain less than 0.5 g of fat)

HEALTH CLAIMS (FOR A CONSUMPTION OF 100 G OF STRAWBERRIES)

Vitamin C

- Vitamin C contributes to:
 - normal function of the immune system during and after intense physical exercise,
 - normal collagen formation for the normal function of blood vessels,
 - normal collagen formation for the normal function of bones,
 - normal collagen formation for the normal function of cartilage,
 - normal collagen formation for the normal function of gums,
 - normal collagen formation for the normal function of skin,
 - normal collagen formation for the normal function of teeth,
 - normal energy-yielding metabolism,
 - normal functioning of the nervous system,
 - normal psychological function,
 - normal function of the immune system,
 - protection of cells from oxidative stress,
 - reduction of tiredness and fatigue,
 - regeneration of the reduced form of vitamin E.
- Vitamin C increases iron absorption.

Folates or vitamin B9

- Folates contribute to:
 - maternal tissue growth during pregnancy,
 - normal amino acid synthesis,
 - normal blood formation,
 - normal homocysteine metabolism,
 - normal psychological function,
 - normal function of the immune system,
 - reduction of tiredness and fatigue.
- Folates have a role in the process of cell division.

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