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Nutritional and Anti-nutritional Composition of *Passiflora edulis* Sims

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ABSTRACT: Passion fruit is rich in nutritional value and health benefits because of its essential components. In north east region advancement work for biochemical traits in *Passiflora edulis* Sims, is complicated by different climatic and geographical conditions. The present study evaluated *Passiflora edulis* for nutritional and anti-nutritional characteristics, antioxidant activity (DPPH) and anthocyanin content. *Passiflora edulis* exhibited higher concentrations of bioactive compounds *viz*., carbohydrates (18.35±0.33 %), total sugar (13.07±0.06%), reducing sugar (3.65±0.02%), non-reducing sugar (9.42±0.08%), antioxidant DPPH activity (81.92±0.45 %), vitamin-C (64.34 ± 1.45 mg/100g), Anthocyanin (2.51±0.82 mg/g), Total free amino acid (936.57±1.63 mg/100g) and lesser amount of anti-nutritional compounds like phenolic compounds 169.60±0.45 mg/100g and phytic acid 3.03±0.02 mg/100g. The research revealed that *Passiflora edulis* has a significant amount of bioactive compounds which can be formulated to enrich foods that will have therapeutic effects on human health.

Keywords: *Passiflora* species, bioactive compounds, nutraceutical value, antioxidants.

INTRODUCTION

In recent years, the extraction of potentially bioactive compounds has emerged as a new trend, with most of these substances possessing beneficial health-promoting components. In that way, passion fruit is becoming increasingly popular in the international market and china passion fruit production area has more than doubled, exceeding brazil by nearly 58.7% (Li *et al*., 2023). In India passion fruit cultivated around 11 thousand hectares, with a production of 56 metric tonnes in 2022 (Agriculture statistics, 2022). Passion fruit is a woody perennial vine which belongs to the family Passifloraceae that originated in the South American rain forest in the Amazon region of Brazil, Northern Argentina and Paraguay. More than 60 *Passiflora* species are cultivated and in high demand for their delicious fruits. *Passiflora* plants are also utilized as traditional medicine in South America, the Netherlands, Spain, and Italy, in addition to being consumed (Patel *et al*., 2009). Purple or red passion fruit (*Passiflora edulis* Sims) and yellow passion fruit (*Passiflora edulis* f. *flavicarpa*) are commonly cultivated in India, while species such as *Passiflora quadrangularis*, *Passiflora incarnata*, *Passiflora ligularis*, and *Passiflora laurifolia* are grown on a limited scale for local consumption in other countries. It grows wild in Niligiri hills, Kodaikanal, Malabar, Kerala, Coorg and Himachal Pradesh in India. This crop has recently gained popularity in the North Eastern hill states of India because of its adaptability, simple farming method, and better yield per unit area with little maintenance. It is a high-value crop with potential for export due to the unique flavour of its juice. In the international market, passion fruit juice is largely sold (Bernacci *et al*., 2008). The fruits are commonly utilized in the production of beverages, squash, and cordials due to their distinct and delicate flavour (Mandal, 2017). *Passiflora* fruits are commonly known in Germany as "Multivitamin juice", which is highly demanded next to apple juice (Fainsod, 2001). The concentrated juice has a strong flavour and is slightly acidic therefore, it has to be diluted and sweetened

before serving. Besides juice, it is also processed into jams, sweets, competes and nectars which are also in high demand. Passion fruit is considered to be a great source of nutrients such as carbohydrates, vitamins, and minerals, all of which are essential for life. The fruit is abundant in bioactive components, such as phenolic acids, anthocyanins, flavonoids and dietary fibre which are the predominant compounds (He *et al*., 2020). The fruit is rich in provitamin A content mainly due to high carotenoid concentration.

These bioactive compounds have pharmacological properties such as anti-mutagenesis and anti-carcinogenesis activities and also prevent degenerative and chronic diseases. These compounds have also been reported to have antiviral, anti-allergic, antiplatelet, and anti-inflammatory properties (Morais *et al*., 2016). The oxidative damage in the body cannot be prevented by the endogenous antioxidants alone, which in association with the exogenous means such as vitamins, minerals, carotenoids and polyphenols that are supplied through the diet help in scavenging the free radicles. In *P. edulis* seeds variety of polyphenols present including stilbenes, including piceatannol (Kawakami *et al*., 2022). The extract of *P. edulis* peels can be used as a natural antibacterial and antioxidant on meat, as well as a food preservative for frozen meat (Ramli *et al.,* 2020) and in addition helps to establish a sustainable food system Macedo *et al*. (2023). Thus, the passion fruit being rich in antioxidant compounds helps in preventing cellular oxidative stress making, it one of the highly preferred fruits for providing healthy life apart from the nutrients present that help fight malnutrition in rural areas thereby giving opportunity for its production (Silva *et al*., 2015). There has not been much study done on the nutritional and anti-nutritional composition of *Passiflora edulis*. As a result, the study aimed to assess the nutritional, anti-nutritional compounds, and antioxidant activity of *Passiflora edulis* to give insight into the pharmacological application and its use in future breeding programmes.

MATERIALS AND METHODS

The present investigation was carried out in the Laboratory of Basic Science and Humanities and Laboratory of Fruit Science, College of Horticulture and Forestry, Central Agricultural University, Pasighat, Arunachal Pradesh during 2022-2023. Fruits of *Passiflora edulis* was collected from the passion fruit block of the College of Horticulture and Forestry, Pasighat, Arunachal Pradesh. The fruits were harvested when fully ripe and were carried immediately to the laboratory. The fruits were washed with distilled water. The samples were packed in plastic bags and stored in a freezer at -18 ℃ until analysis. The pulp and seeds of passion fruit were crushed together for the analysis.

Nutritional Analysis

Carbohydrate content. Total carbohydrate content was calculated using Hedge and Hofreiter's (1962) method. Five mL of 2.5 N diluted HCl was used to hydrolyze 0.1g of sample material. The volume was made up to 100 mL, followed by centrifugation, and the supernatant was collected. Each tube received 1 mL aliquot and 4 mL of anthrone reagent. For 8 minutes, tubes were immersed in a boiling water bath. The absorbance was recorded at 630 nm in a UV-visible spectrophotometer. The resulting values after calculation were mentioned in terms of percentage

$$\text{Carbohydrate content (mg/100g)} = \frac{\text{mg of glucose}}{\text{The volume of a test sample}} \times 100$$

Sugar analysis. The total sugar content was extracted using the AOAC (1990) method, which involved mixing of 0.5 g sample with 50 mL of 80% hot ethanol, followed by refluxing and filtering with distilled water. The extracted sugar sample was calculated using the Dubois *et al.* (1956) method by mixing 1 mL of 5% phenol along with 95.5% sulphuric acid to 5mL of water and absorbance was recorded at 490 nm. Somogyi's (1952) method was used to determine reducing sugar content. Sample (0.1 g) was added to 5 mL of 80 % hot ethanol and centrifuged at 3000 rpm for 5 minutes. 1 mL of alkaline copper tartrate reagent was added and heated for 10 minutes followed by the addition of arsenomolybdate reagent, the absorbance was recorded at 620 nm. The reducing sugar (%) was calculated by using the formulae:

Absorbance corresponds to 0.1 mL of test = x mg glucose

$$10 \text{ ml contains} = \frac{x}{0.1} \times 10 \text{ mg of glucose}$$

Non–reducing sugar content was estimated by subtracting the reducing sugar from the total sugar. Sugar concentrations were calculated by a standard curve method and results were expressed in percentage.

Non-reducing sugar = (Total Sugar - Reducing sugar)

Antioxidant Analysis

Antioxidant DPPH Activity. The antioxidant activity was determined using Sharma and Bhat's (2009) method, in which 0.2 g of sample was homogenised in 5 mL of ethanol and 0.3 mL of DPPH reagent (0.5 mM in ethanol) was added. After 30 minutes of storage at room temperature in the dark, the discolouration of DPPH was detected at 517nm. The results were given in percentages.

$$\text{Inhibition (\%)} = \frac{\text{A (Control) - A (Test sample)}}{\text{A (control)}} \times 100$$

Anthocyanin. Ranganna's (1986) approach was used to calculate anthocyanin content in the pulp. A sample weighing 1 g was ground with 10 mL of ethanolic HCl, transferred to a 100 mL volumetric flask, and refrigerated overnight at 4°C. 0.2 mL of extract was collected and volume was made up to 10 mL with Ethanolic HCl and record the OD value of the filtrate at 535 nm; findings were expressed as mg/g of fresh weight.

$$\text{Total OD/100g} = \frac{\text{OD} \times \text{Vol.made up of extract used for colour measurement} \times \text{total volume}}{\text{0.1mL of extract used} \times \text{weight of sample}} \times 100$$

$$\text{Total anthocyanin (mg/100 g)} = \frac{\text{Total OD per 100 g}}{98.2}$$

Vitamin C. The method described by Jagota and Dani (1982) was used to calculate the ascorbic acid content.1 g of sample was ground in an equal volume of 6% metaphosphoric acid, EDTA solution, and 50 mL of 3% metaphosphoric acid was added to make up the volume. The sample was centrifuged at 5000 rpm for 10 minutes. In each tube, 0.4 mL Folin-ciocalteu was added and absorbance was measured at 760nm using a UV visible spectrophotometer. The results were expressed in mg/100g of fresh weight.

$$\text{Vitamin C (mg/100g)} = \frac{\text{A total volume of the sample} \times \text{conc.of the Vit - C} \times 100 \times 1}{\text{Weight of the sample} \times \text{amount of sample} \times 1000}$$

Total free amino acid and phenol content. Total free amino acid content was estimated by the method given by Moore and Stein (1948**)** while phenol content was determined using the method as suggested by Malick and Singh (1980).

Phytic acid. Phytic acid content was determined by using Wheeler and Ferrel (1971) method. The ground sample (1 g) was incubated for 30 minutes in 50 mL of 3% TCA (Trichloroacetic acid). The sample was centrifuged, and 10 mL of aliquot was collected and mixed with 4 mL of $FeCl_3$. The sample tube was heated for 45 minutes and centrifuged for 5 minutes. The precipitate was washed with 20 ml of 3% TCA, kept in a water bath for 10 minutes followed by centrifugation again at 3000 rpm for 15 minutes. The precipitate was collected, 1.5N NaOH was added and volume was made up to 30 mL with distilled water followed by washing with 70 ml hot water and then the precipitate was dissolved in 40 mL of 3.2 N HNO_3. Five mL aliquot was collected and the volume made up to 70 mL with distilled water. 20 mL of 1.5 M KSCN was added to the sample and absorbance was read at 480 nm using a UV visible spectrophotometer. Results were expressed as mg/100g of fresh fruit.

Statistical analysis. The experiment was carried out in a completely randomized design with three replications. OPSTAT software was used to perform statistical analysis such as standard error of the mean, coefficient of variance, and test of significance. ANOVA with a single factor was used to compare means.

RESULTS AND DISCUSSION

Nutritional Analysis

Carbohydrates content. Carbohydrates provide energy, assist in regulating blood glucose and insulin metabolism, contribute to cholesterol and triglyceride metabolism, and aid in fermentation (Holesh *et al.*, 2022). The carbohydrate accumulates in the developing fruits as starch, sucrose, glucose, and fructose. *Passiflora edulis* recorded a carbohydrate content of 18.35 ± 0.33% (Table 1). The higher amount of carbohydrate content in *Passiflora edulis* might be due to the high starch and sugar content in the pulp. The present study findings agreed with an experiment conducted by Pruthi e*t al*., (1963) where the total carbohydrate content in the juice of passion fruit was 14.1 to 21.9 %.

Sugar Content. Sugar serves as a source of energy for the brain and nervous system and is essential for the quality of fruits. The present study observed the total sugar (13.07±0.06%), reducing sugar (3.65±0.02%) and non-reducing sugar (9.42±0.08%) in *Passiflora edulis* (Table 1). The findings were similar to the values reported by Patel *et al*., (2014), where total sugar, reducing sugar, and non-reducing sugar content in purple passion fruit pulp was 18.15%, 3.92%, and 14.18% respectively. The sugar content may differ as per environmental conditions and genotype thus, leading to differences in the taste of fruit.

Antioxidant DPPH activity. Antioxidants are becoming scientifically interesting compounds because of their numerous benefits, such as anti-ageing and anti-inflammatory properties. Antioxidants stabilize the food and prolong its preservation thus these are added to the edible coatings and films for packaging of food to improve the quality (Zehiroglu *et al*., 2019). Table 1 shows that *Passiflora edulis* exhibited antioxidant activity with inhibition percentages of 81.92 ± 0.45%. The present findings were in accordance with a study conducted by Wong *et al*., (2014) where passion fruit reported antioxidant activity of 68.54 %. The high antioxidant activity of *Passiflora edulis* may be due to the presence of high poly phenol and Vitamin-C content in the fruit *Passiflora edulis* addressing its scope for use in cosmetics, food and pharma industries.

Anthocyanin. Anthocyanins are naturally occurring pigments that belong to the flavonoid group, a subgroup of the polyphenol family. Plant-derived anthocyanins are extensively utilized as dyes, natural food colourants and culinary additives. The resulting values mentioned in Table 1 indicate that the anthocyanin was in greater concentration in the *Passiflora edulis* fruit (2.51 ± 0.82 mg/g of fresh fruit). The findings are in agreement with Ghada *et al*. (2020) where *Passiflora edulis* was reported to contain 3.4 mg/g of anthocyanin indicating its use in the food industry as a natural food colour due to the presence of high anthocyanin pigment.

Vitamin-C. Vitamin C is required for the growth and restoration of tissues throughout the body. It helps in the formation of collagen, an essential protein that is used to build skin, ligaments, blood vessels and tendons. Non-heme iron absorption is improved by vitamin C. Table 1 indicates that the amount of ascorbic acid content in *Passiflora edulis* was 64.34 ± 1.45mg/100g. These findings agree with research conducted by Pertuzatti *et al*. (2015), where ascorbic acid values ranged from 40 to 65 mg/100 g of fresh weight in yellow passion fruit. Vitamin formation in passion fruit varies depending on various factors, viz., environmental factors, cultural practices and stage of fruit maturity etc. (Rotili *et al*., 2013).

Free amino acid. Amino acids are needed for the development of body protein as well as other nitrogen-containing substances like peptide hormones, creatine and certain neurotransmitters. The present investigation depicted a significant amount of

amino acid (Table 1) in the pulp of *Passiflora edulis* (936.57 ± 1.63 mg/100g). Song *et al*. (2018) reported 1097 mg/100g of amino acid in fruit pulp, which is in accordance with the current findings. Variations in amino acid content may be due to different agroclimatic conditions and maturity stage of fruits.

Anti-nutritional analysis

Content of phenol and phytic acid

Phenolic compounds have been utilized to treat a variety of common human disorders, including hypertension, metabolic problems, and incendiary infections since phenolic compounds can block enzymes involved in the development of human diseases. The total phenolic compounds 169.60 ± 0.45 mg/100g recorded in *Passiflora edulis* (Table 1) is analogous to the findings of Malaterre *et al*. (2016); the total phenol content reported in passion fruit juice was 286.6 mg GAE/100g of total. Variations in phenolic compounds present in fruit may be due to crop year, geographical location and stage of maturity. Phytase is a phosphatase enzyme found in animals, plants and microbes such as some bacteria, that catalyzes the hydrolysis of phytic acid. Phytic acid is the major storage form of phosphorous present in plants such as cereals, legumes, oil seeds and nuts. Phytic acid is a dietary inhibitor that chelates the micronutrients viz., calcium, iron, magnesium, manganese, and zinc, preventing the bioavailability of these micronutrients in the human body due to lack of phytase enzyme (Gupta *et al*., 2015). Table 1 shows that the amount of phytic acid was 3.03 ± 0.02mg/100g in *Passiflora edulis* which corresponded to the findings of Adeyeye and Aremu *et al*. (2017), in their study they reported the phytate content of 3.54 -11.21mg/100g. Phytic acid is a natural antioxidant present in plant species that has been reported to have antibacterial and antidiabetic activities and is considered to prevent several human diseases (Kumar *et al*., 2021). Jariwalla *et al*. (1990) also reported that feeding poultry birds with phytate supplementation considerably reduced blood cholesterol and triglyceride levels.

Table 1: Nutritional and anti-nutritional content in *Passiflora edulis* (mean and standard deviation).

Parameters	*Passiflora edulis*
Carbohydrates (%)	18.35±0.33
Total sugar (%)	13.07±0.06
Reducing sugar (%)	3.65±0.02
Non-reducing sugar (%)	9.42±0.08
Antioxidant DPPH (%)	81.92±0.45
Anthocyanin (mg/g)	2.51±0.82
Vitamin-C (mg/100g)	64.34 ± 1.45
Free amino acid (mg/100g)	936.57±1.63
Phenol (mg/100g)	169.60±0.45
Phytic acid (mg/100g)	3.03±0.02

CONCLUSIONS

Passiflora plants are gaining popularity among consumers worldwide because of their nutritional and organoleptic features. Passion fruit and its by-products are high in polyphenols, carotenoids, vitamins and other nutritional compounds. In the present investigation, the pulp of *Passiflora edulis* recorded the presence of high amount of nutrients. It was observed that *Passiflora edulis* pulp has a high antioxidant capacity (vitamin C, DPPH and anthocyanin) and low antinutrient content (phenol and phytic acid), which promotes good health. The findings of the present study can be considered for the preference of Passiflora edulis for value addition as well as fresh consumption as a source of nutrients. There are other potential research opportunities to improve the utilization of passion fruit and its by products for human consumption. The pharmaceutical activity reports of *P. edulis* plant are generally based on preliminary research, and the models employed lack appropriate standards or reasonable dose. Future research and practice will also focus on the structure-activity relationship and molecular mechanism of bioactive components or crude extracts of *P. edulis.*

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Conflict of Interest. None.

REFERENCES

Adeyeye, E. I. and Aremu, M. O. (2017). Chemical composition of the raw fruit coat, seed and pulp of passion fruit (*Passiflora edulis*). *Journal Trends in Science & Technology, 2*, 334-341.

Agriculture Statistics at a glance, (2022). Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, New Delhi.

AOAC (1990). Official Methods of Analysis of the Association of Official Agricultural Chemists, Association of Analytical Chemists, Washington, D.C. p. 83

Bernacci, L. C., Soares-Scott, M. D., Junqueira, N. T. V., Passos, I. R. D. S. and Meletti, L. M. M. (2008). *Passiflora edulis* Sims: the correct taxonomic way to cite the yellow passion fruit (and of others colors). *Revista Brasileira de fruticultura, 30*, 566-576.

Dubois, M., Gilles, K. A., Hamilton, J. K., Rebers, P. T. and Smith, F. (1956). Colorimetric method for determination of sugars and related substances. *Analytical Chemistry, 28*(3), 350-356.

Fainsod, G. S. (2001). Composition and potential health benefits of passion fruit juice. *Proceeding of the American Chemical Society, Washington, Chicago*.

Ghada, B., Pereira, E., Pinela, J., Prieto, M. A., Pereira, C., Calhelha, R. C. and Ferreira, I. C. (2020). Recovery of anthocyanins from passion fruit epicarp for food colorants: Extraction process optimization and evaluation of bioactive properties. *Molecules, 25*(14), 3203.

Gupta, R. K., Gangoliya, S. S. and Singh, N. K. (2015). Reduction of phytic acid and enhancement of bioavailable micronutrients in food grains. *Journal of food science and technology, 52*, 676-684.

He, X., Luan, F., Yang, Y., Wang, Z., Zhao, Z., Fang, J., Wang, M., Zuo, M. and Li, Y. (2020). *Passiflora edulis*: An Insight into current researches on phytochemistry and pharmacology. *Frontiers in Pharmacology, 11*, 617.

Hedge, J. E. and Hofreiter, B. T. (1962). Determination of reducing sugars and carbohydrates. In: Whistler R.L.

and Be Miller, J.N. (ed) Carbohydrate Chemistry, 17th ed. Academic Press, New York, USA, pp. 380-394.

Holesh, J. E., Aslam, S. and Martin, A. (2022). Physiology, Carbohydrates. In: Statpearls (Internet). *Treasure Island (FL): StatPearls Publishing*, *26*.

Jagota, S. K. and Dani, H. M. (1982). A new colorimetric technique for the estimation of vitamin C using folin-phenol reagent. *Annals of Clinical Biochemistry*, *127*(1), 178-182.

Jariwalla, R. J., Sabin, R., Lawson, S. and Herman, Z. S. (1990). Lowering of serum cholesterol and triglycerides and modulation of divalent cations by dietary phytate. *Journal of Applied Nutrition*, *42*(1), 18-28.

Kawakami, S., Morinaga, M., Sen-Tsukamoto, S., Mori, S., Matsui, Y. and Kawama, T. (2022). Constituent Characteristics and Functional Properties of passion fruit seed extraction. *Life*, *12*(1), 38.

Kumar, A., Singh, B., Raigond, P., Sahu, C., Mishra, U. N., Sharma, S. and Lal, M. K. (2021). Phytic acid: Blessing in disguise, a prime compound required for both plant and human nutrition. *Food Research International*, *142*, 110193.

Li, K., Wang, J., Jalil, H. and Wang, H. (2023). A fast and lightweight detection algorithm for passion fruit pests based on improved Y0L0v5. *Computers and Electronics in Agriculture*, *204*, 107534.

Macedo, M. C. C., Correia, V. T. D. V., Silva, V. D. M., Pereira, D. T. V., Augusti, R., Melo, J. O. F. and Fante, C. A. (2023). Development and Characterization of Yellow Passion Fruit Peel Flour (*Passiflora edulis* f. *flavicarpa*). *Metabolites*, *13*(6), 684.

Malaterre, S. A., Stanislas, G., Douraguia, E. and Gonthier, M. P. (2016). Evaluation of nutritional and antioxidant properties of the tropical fruit's banana, litchi, mango, papaya, passion fruit and pineapple cultivated in Reunion French Island. *Food Chemistry*, *212*, 225-233.

Malick, C. P. and Singh, M. B. (1980). Plant enzymology and histo enzymology. Kalyani Publishers, New Delhi, p. 286.

Mandal, G. (2017). Production Preference and importance of passion fruit (*Passiflora edulis*): A review. *Journal of Agricultural Engineering and Food Technology*, *4*, 27-30.

Moore, S. and Stein, W. H. (1948). Methods in Enzymol. Academic Press, New York, p. 468.

Morais, C. A., Rosso, V. V., Estadella, D. and Pisani, L. P. (2016). Anthocyanins as inflammatory modulators and the role of the gut microbiota. *Journal of Nutritional Biochemistry*, *33*, 1-7.

Patel, S. S., Saleem, T. M., Ravi, V., Shrestha, B., Verma, N. K. and Gauthaman, K. (2014). *Passiflora incarnata* Linn: A phytopharmacological review. *International Journal of Green Pharmacy*, *3*(4), 277-280.

Patel, S. S., Verma, N. K. and Gauthaman, K. (2009). *Passiflora incarnate* Linn: a review on morphology, phytochemistry and pharmacological aspects. *Pharmacognosy Reviews*, *3*, 186-192.

Pertuzatti, P. B., Sganzerla, M., Jacques, A. C., Barcia, M. T. and Zambiazi, R. C. (2015). Carotenoids, tocopherols and ascorbic acid content in yellow passion fruit (*Passiflora edulis*) grown under different cultivation systems. *Food Science and Technology*, *64*(1), 259-263.

Pruthi, J. S. (1963). Physiology, chemistry, and technology of passion fruit. *Advances in Food. Research*, *12*, 203-282.

Ramli, A. N. M., Manap, N. W. A., Bhuyar, P. and Azelee, N. I. W. (2020). Passion fruit (*Passiflora edulis*) peel powder extract and its application towards antibacterial and antioxidant activity on the preserved meat products. *SN Applied Sciences*, *2*, 1-11.

Ranganna, S. (1986). Handbook of analysis and quality control for fruit and vegetable products. Tata McGraw-Hill Publishing Co. Ltd, New Delhi, p. 99.

Rotili, M. C. C., Vorpagel, J. A., Braga, G. C., Kuhn, O. J. and Salibe, A. B. (2013). Antioxidant activity, chemical composition and conservation of yellow passion fruit packed with PVC film. *Revista Brasileira de Fruticultura*, *35*(4), 942-952.

Sharma, O. P. and Bhat, T. K. (2009). DPPH antioxidant assay revisited. *Journal of Food Chemistry*, *113*(4), 1202-1205.

Silva, R. M., Placido, G. R., Silva, M. A. P. D., Castro, C. F. D. S., Lima, M. S. and Caliari, M. (2015). Chemical characterization of passion fruit (*Passiflora edulis* f. *flavicarpa*) seeds. *African Journal of Biotechnology*, *14*(14), 1230-1233.

Somogyi, M. (1952). Notes on sugar determination. *Journal of Biological Chemistry*, *195*, 19-23.

Song, Y., Wei, X. Q., Li, M. Y., Duan, X. W., Sun, Y. M., Yang, R. L., Su, X. D., Huang, R. M. and Wang, H. (2018). Nutritional composition and antioxidant properties of the fruits of a Chinese wild *Passiflora foetida. Molecules*, *23*(2), 459.

Wheeler, E. L. and Ferrel, R. E. (1971). A method for phytic acid determination in wheat and wheat fractions. *Cereal Chemistry*, *48*(3), 312-320.

Wong, Y. S., Sia, C. M., Eng, H., Ang, Y. K., Chang, S. K. and Yim, H. S. (2014). Influence of extraction conditions on antioxidant properties of passion fruit (*Passiflora edulis*) peel. *Acta Scientiarum Polonorum Technologia Alimentaria*, *13*(3), 257-265.

Zehiroglu, C. and Ozturk Sarikaya, S. B. (2019). The importance of antioxidants and place in today's scientific and technological studies. *Journal of food science and technology*, *56*, 4757-4774.

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