Folate in Red Rhapsody Strawberry – Content and Storage Stability

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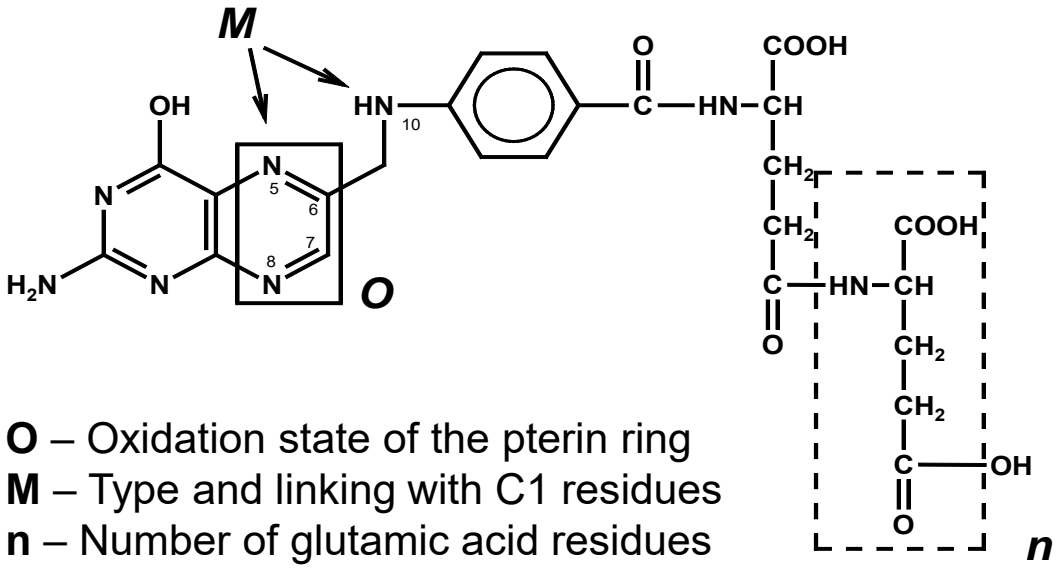
Folate(s)

"Fact-Sheet":

- Water-soluble vitamers
- Pteroylglutamates
- Involved in DNA, protein & neurotransmitter synthesis
- Deficiency is associated with **neural tube defects in newborns (*Spina bifida*)**
- Inadequate intake is linked to CV disease, colorectal cancer & Alzheimer's
- Regarded as a **critical vitamin** in many countries
- Mandatory folate fortification e.g. in **Australia**, USA, Canada



O – Oxidation state of the pterin ring
M – Type and linking with C1 residues
n – Number of glutamic acid residues

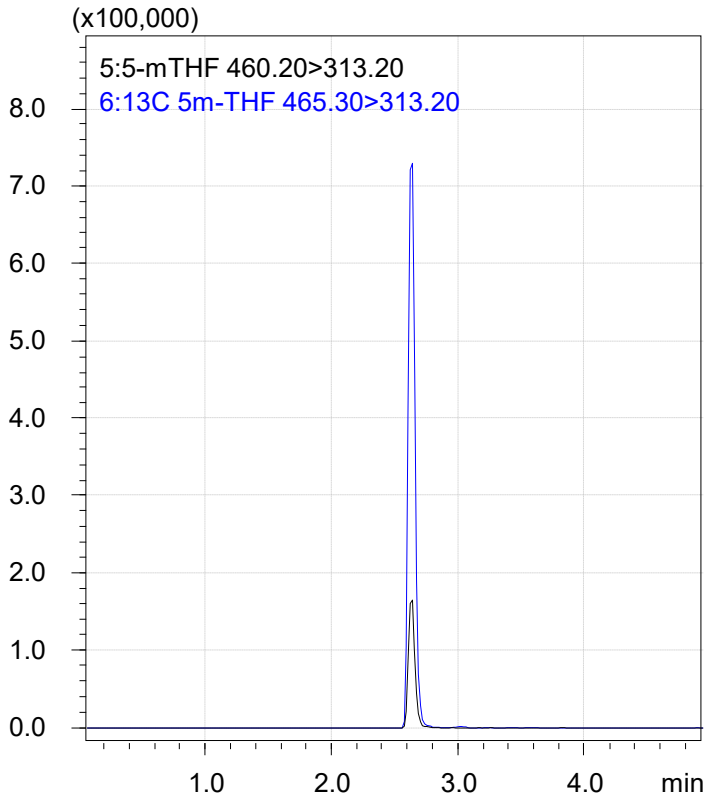
Strawberries & Folate(s)

- Strawberries are considered a tasty and healthy fruit consumed all over the world and may potentially be an important dietary source of natural folates.
- However, the relative importance of strawberry as a dietary source will depend on the total folate concentration, vitamer profile, storage stability and bioavailability to humans.
- Inconsistent reports about folate content in strawberry fruit (low to high)!
- Red Rhapsody, an important commercial strawberry cultivar in Australia, was screened for its folate content and storage.

Material & Methods: Study Design

- Red Rhapsody strawberries (7 kg) were sourced fresh from a commercial farm in Brisbane, Queensland, Australia.
- Individual folate vitamers in the strawberry samples (fresh and during a 14-day storage trial at 4°C) were determined by stable isotope dilution assay (SIDA).

Material & Methods: SIDA



SIDA:

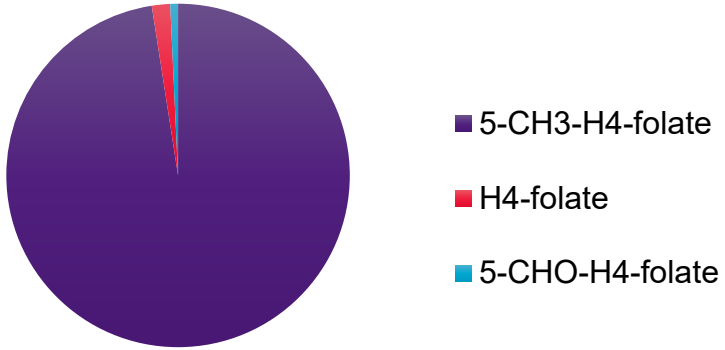
- State-of-the-art analytical technology
- Selective analysis of individual vitamers
- Compensation for processing losses

[Striegel et al., Front. Chem. 6:11. doi: 10.3389/fchem.2018.00011]

5-mTHF: 5-methyltetrahydrofolate
(important folate vitamer in biological systems)

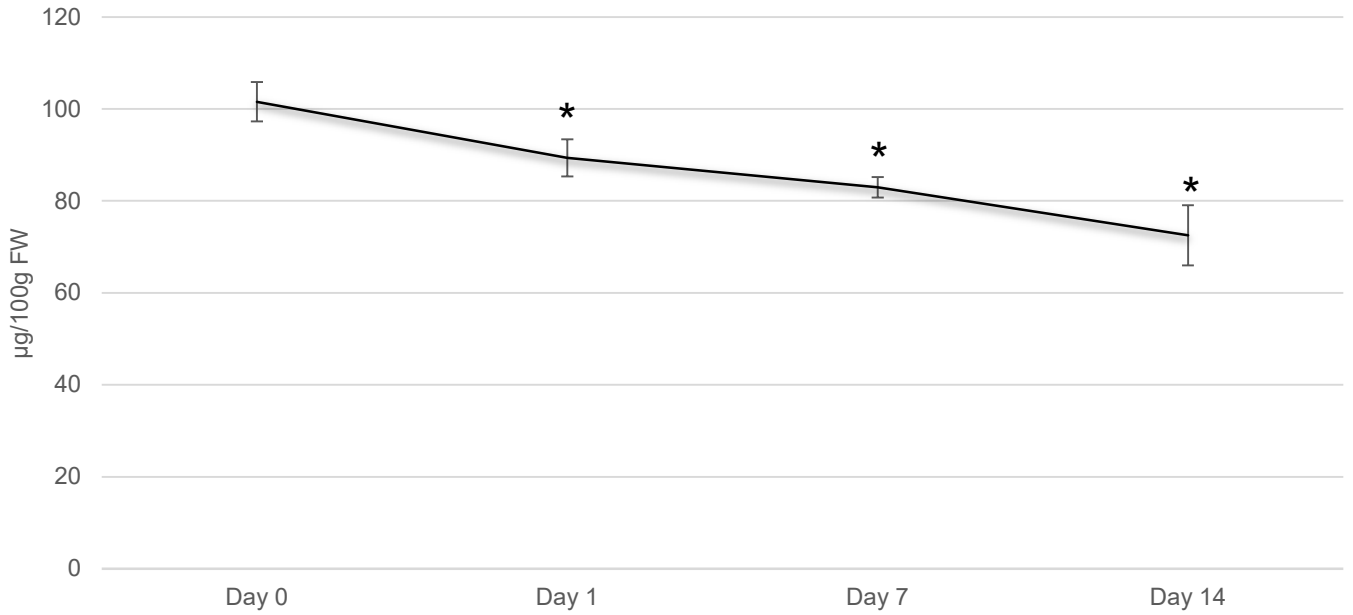
Results: Folate content in Red Rhapsody

- **Total folate content** ranged from 90-118 µg/100 g fresh weight (fw), which was well above the value in the Australian Food Composition Database (AFCD; 39 µg/100 g fw).
- **5-methyltetrahydrofolate** (biologically active form) as the principal vitamer (up to 95%).



Folate vitamers in Red Rhapsody:
5-CH3-H4-folate – 5-methyltetrahydrofolate
5-CHO-H4-folate – 5-formyltetrahydrofolate
H4-folate – tetrahydrofolate
10-CHO-PteGlu (10-formyl-pteroylglutamic acid) & PteGlu (pteroylglutamic acid) are not visible due to their low concentrations

Results: Storage Trial



- Total folate content in Red Rhapsody strawberries during a 14-day storage trial at 4°C.
- Total folate: sum of 5-CH3-H4folate, 5-CHO-H4folate, H4-folate, 10-CHO-PteGlu and PteGlu.

[*Data are mean ± SD (n=5); *P<0.05 vs. day 0*]

- Folate concentration remained relatively stable during refrigerated storage (loss of only 28% after 14 days of storage).
- Still considerably higher than in the AFCD (73 vs. 39 µg/100 g fw).

Conclusions

- The results of the present study are relevant for consumers since the inherent perishability of strawberry fruit makes refrigerated storage (approx. 4°C) common practice in Australian households.
- Furthermore, Red Rhapsody strawberries with a total folate content of up to 118 µg/100 g fw when fresh, can also be regarded as an important dietary source of natural folates even when stored at 4°C for 14 days.
- However, human clinical trials are warranted to determine folate-bioavailability in this important commercial strawberry cultivar.

Thank you!

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Horticulture Innovation Australia