

Beta-Carotene Content in Canistel (*Pouteria campechiana*):

Nutritional and Health Benefits



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Abstract

Canistel (*Pouteria campechiana*), also known as eggfruit, is recognized for its high carotenoid content, particularly beta-carotene, a precursor of vitamin A with strong antioxidant properties. This study aims to evaluate the beta-carotene content and antioxidant capacity of canistel extracts prepared using three different organic solvents: ethanol, ethyl acetate, and the 3:4 volumetric mixture of ethanol and ethyl acetate. Beta-carotene content was investigated by UV-Visible spectroscopy, while antioxidant capacity was assessed using the diphenyl picrylhydrazyl (DPPH) radical scavenging assay. The extraction yields varied from 1.55% to 22.56%, with ethanol yielding the highest amount and ethyl acetate the lowest. The mixed solvent extract exhibited the highest beta-carotene content ($1,590.45 \pm 2.95 \mu\text{g/g}$ dry weight) and the greatest antioxidant activity ($\text{IC}_{50} = 50.56 \pm 0.18 \text{ mg/mL}$), followed by ethyl acetate ($899.92 \pm 2.95 \mu\text{g/g}$, $\text{IC}_{50} = 144.74 \pm 3.67 \text{ mg/mL}$) and ethanol ($396.25 \pm 1.48 \mu\text{g/g}$, $\text{IC}_{50} = 151.36 \pm 3.78 \text{ mg/mL}$). The superior extraction efficiency of the mixed solvent was attributed to its optimized polarity, which enhances beta-carotene solubility and the extraction of antioxidant compounds. Gallic acid, used as a reference standard, demonstrated substantially lower IC_{50} values, indicating significantly higher antioxidant potency compared to canistel extracts. These findings highlight the potential for developing functional food, pharmaceutical, or cosmetic products with health benefits derived from canistel.

Introduction

Canistel

- Yellow-orange color fruit has soft texture, sweet and creamy flavor.
- In Thailand, it is widely found in the northern regions.
- Fruit pulp contains high levels of carotenoids.



Figure 1 Canistel

Beta carotene

- A potent antioxidant.
- Pro-vitamin A.
- An integral component in various industries.

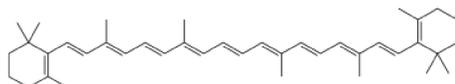


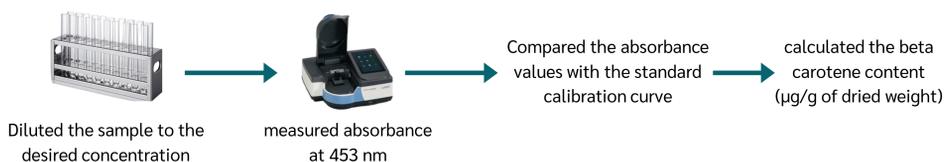
Figure 2 Structure of beta carotene

Material and Method

Beta carotene extraction



Determination of beta carotene content by UV-vis spectroscopy



Evaluation of antioxidant activity



Prototype formulation development



Results

Different solvents extraction



Figure 3 Ethanol extract



Figure 4 Ethyl acetate extract



Figure 5 Ethanol : Ethyl acetate (3:4) extract

Table 1 % yield of canistel extraction using each solvents

Solvent	Ethanol	Ethyl acetate	Ethanol : Ethyl acetate (3:4)
%yield	22.56 ± 0.76	1.55 ± 0.20	9.59 ± 0.78

Beta carotene content

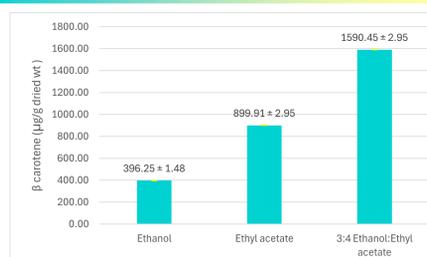


Figure 6 Beta carotene content in each extracts

Antioxidant activity

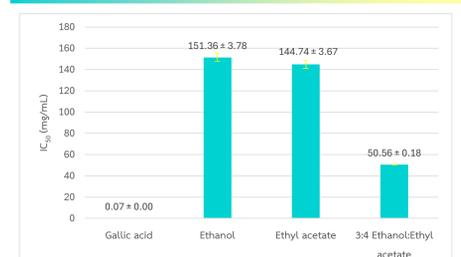


Figure 7 IC_{50} of each extracts

Prototype formulation development



Ingredients

- Oats
- Raisins
- Chia seeds
- Peanut butter
- Honey
- Almonds
- Dark chocolate 70%
- Vanilla extract
- Himalayan pink salt
- ★ Beta carotene extract from canistel

- ✓ Beta carotene-rich
- ✓ Antioxidants
- ✓ Fiber-Rich
- ✓ Natural sweeteners
- ✓ Sustained energy

Figure 8 Prototype of energy bar product

Conclusion

- The extraction yields varied from 1.55% to 22.56%.
- The mixed solvent extract exhibited the highest beta-carotene content ($1,590.45 \pm 2.95 \mu\text{g/g}$ dry weight).
- The mixed solvent extract also exhibited the greatest antioxidant activity with an IC_{50} of $50.56 \pm 0.18 \text{ mg/mL}$, followed by ethyl acetate ($\text{IC}_{50} = 144.74 \pm 3.67 \text{ mg/mL}$) and ethanol ($\text{IC}_{50} = 151.36 \pm 3.78 \text{ mg/mL}$).
- These findings highlight the potential of developing prototype energy bar product from canistel.

Further study

- Determination of beta carotene content using HPLC.

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- Department of Chemistry, Faculty of Science, Chiang Mai University

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