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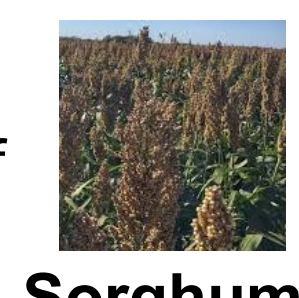
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PROBLEM & PROPOSED SOLUTION

- UNL currently has a strong research program on improvement of biomass feedstock sorghum and camelina to improve agronomic properties of these energy crops.



Camelina



Sorghum

ISSUES

- Current approaches use only limited fractions of sorghum and camelina to produce biofuel, and remaining parts are treated as waste.

PROPOSED SOLUTION

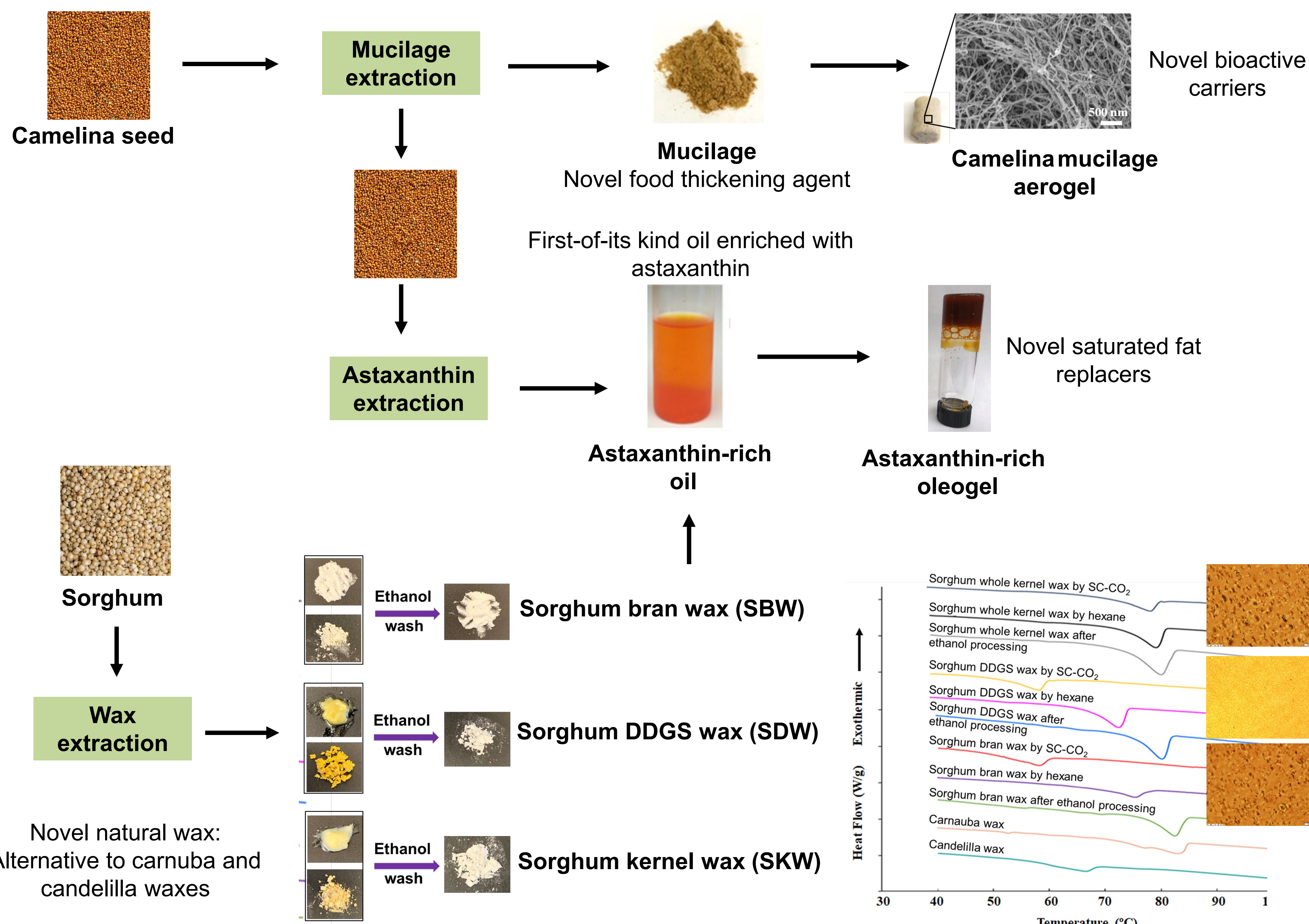
Innovative interdisciplinary approaches

- To develop an innovative integrated approach to utilize wastes obtained from the processing of camelina and sorghum for biofuel production.
- To produce several high value-added fractions and products to be used as novel food ingredients..

GOAL AND OBJECTIVES

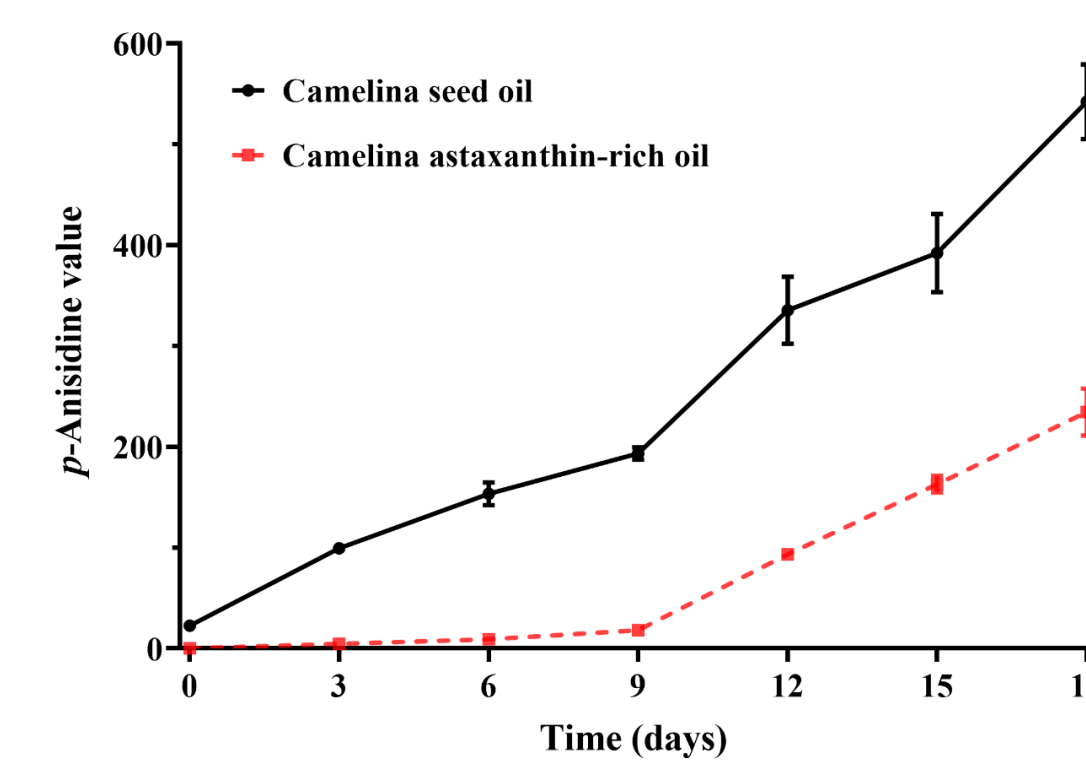
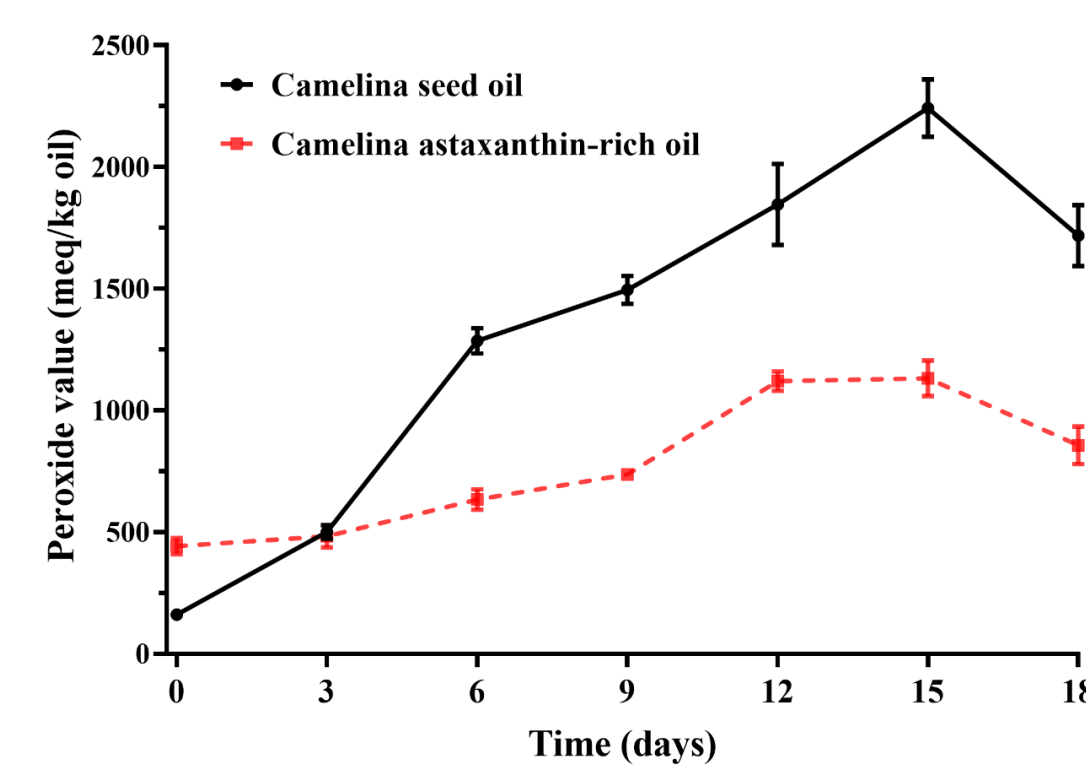
- Goal:** To develop novel high value products and fractions from camelina and sorghum.
- Objectives:**
- To extract camelina mucilage, prepare camelina mucilage aerogel and evaluate the printability of printing paste with mucilage.
 - To produce camelina astaxanthin-rich oil and evaluate the oxidative stability improvement.
 - To extract and purify sorghum wax and evaluate the printability of wax-oleogel paste.

DEVELOPMENT OF NOVEL FOOD INGREDIENTS

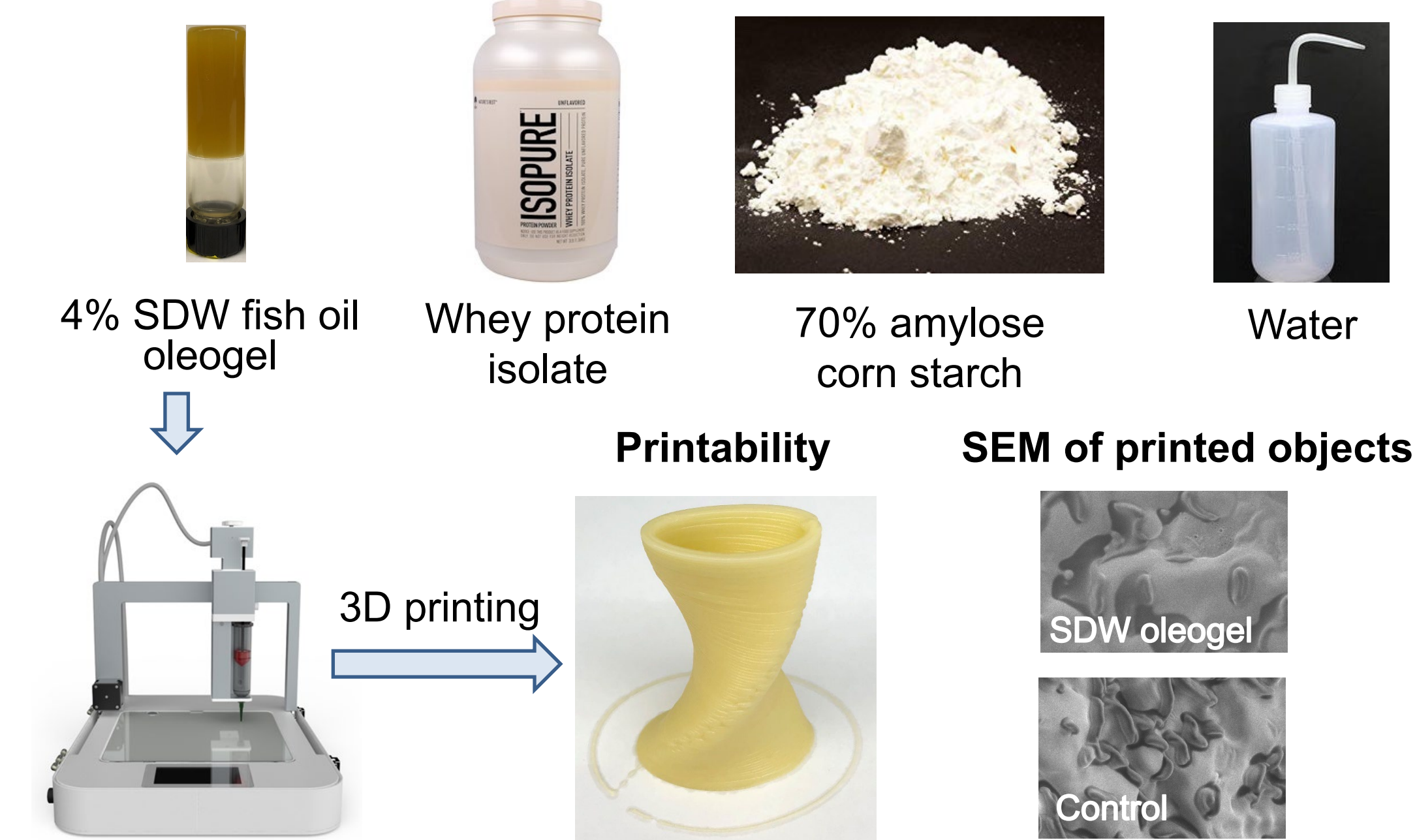


APPLICATIONS

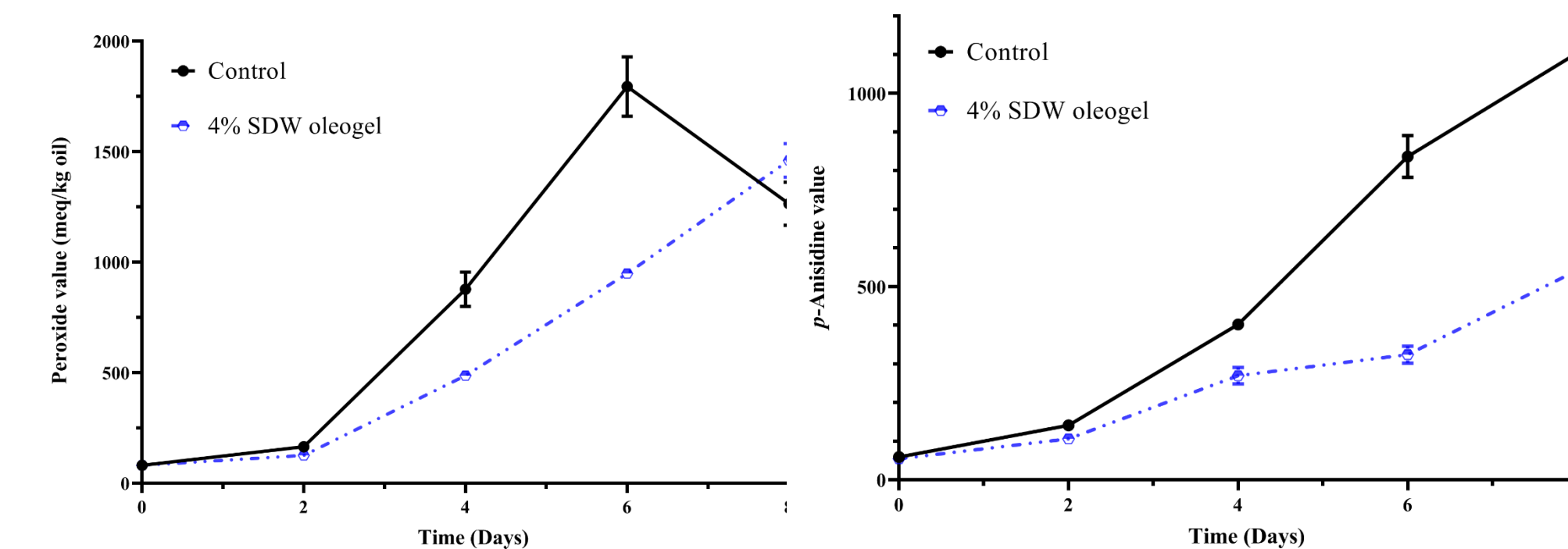
Astaxanthin-rich camelina seed oil is more stable against oxidation



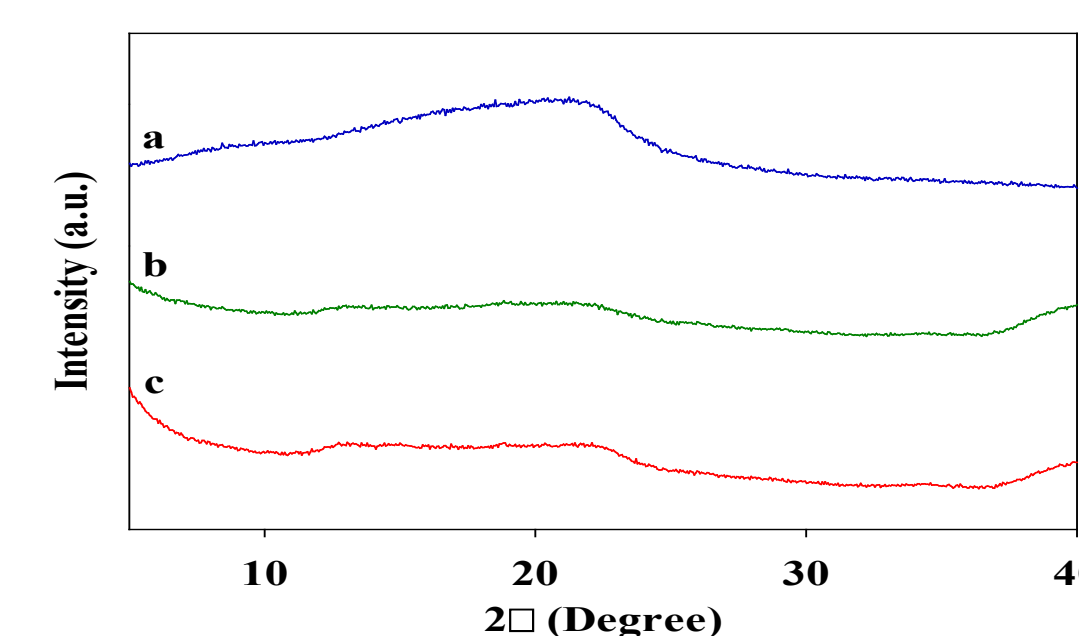
3D food printing using sorghum wax oleogel



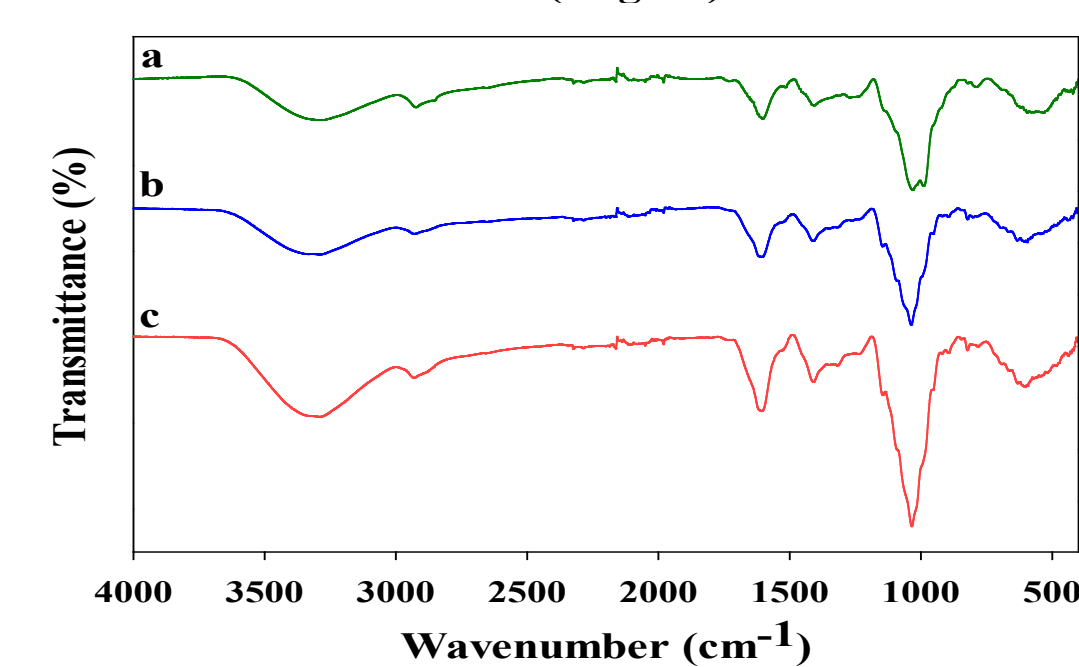
Oxidative stability of the 3D printed samples is higher



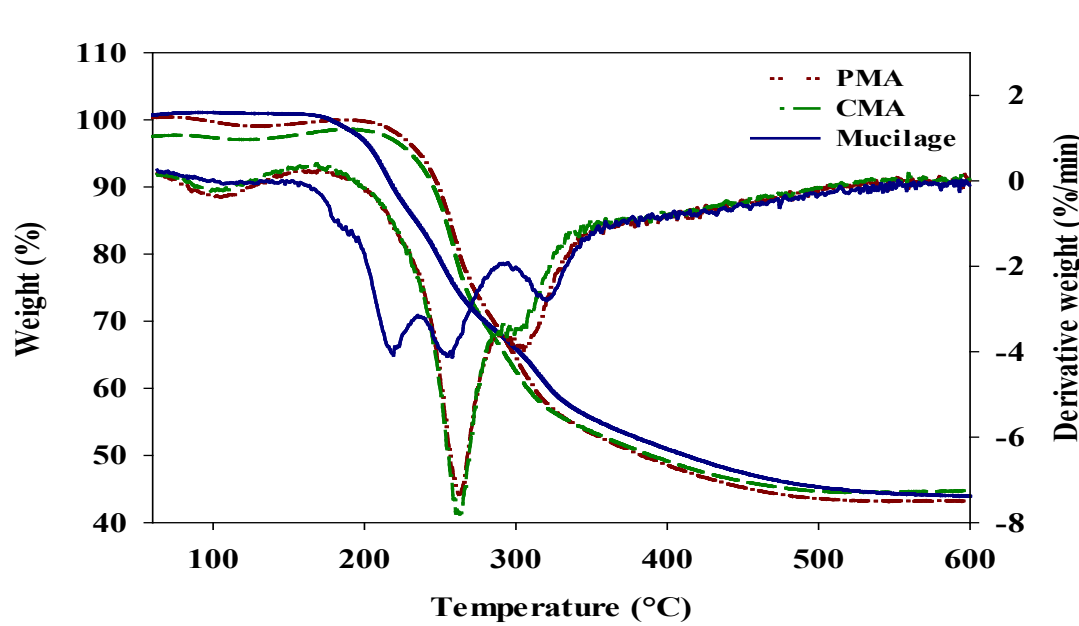
Characterization of camelina mucilage aerogel



Crystallinity

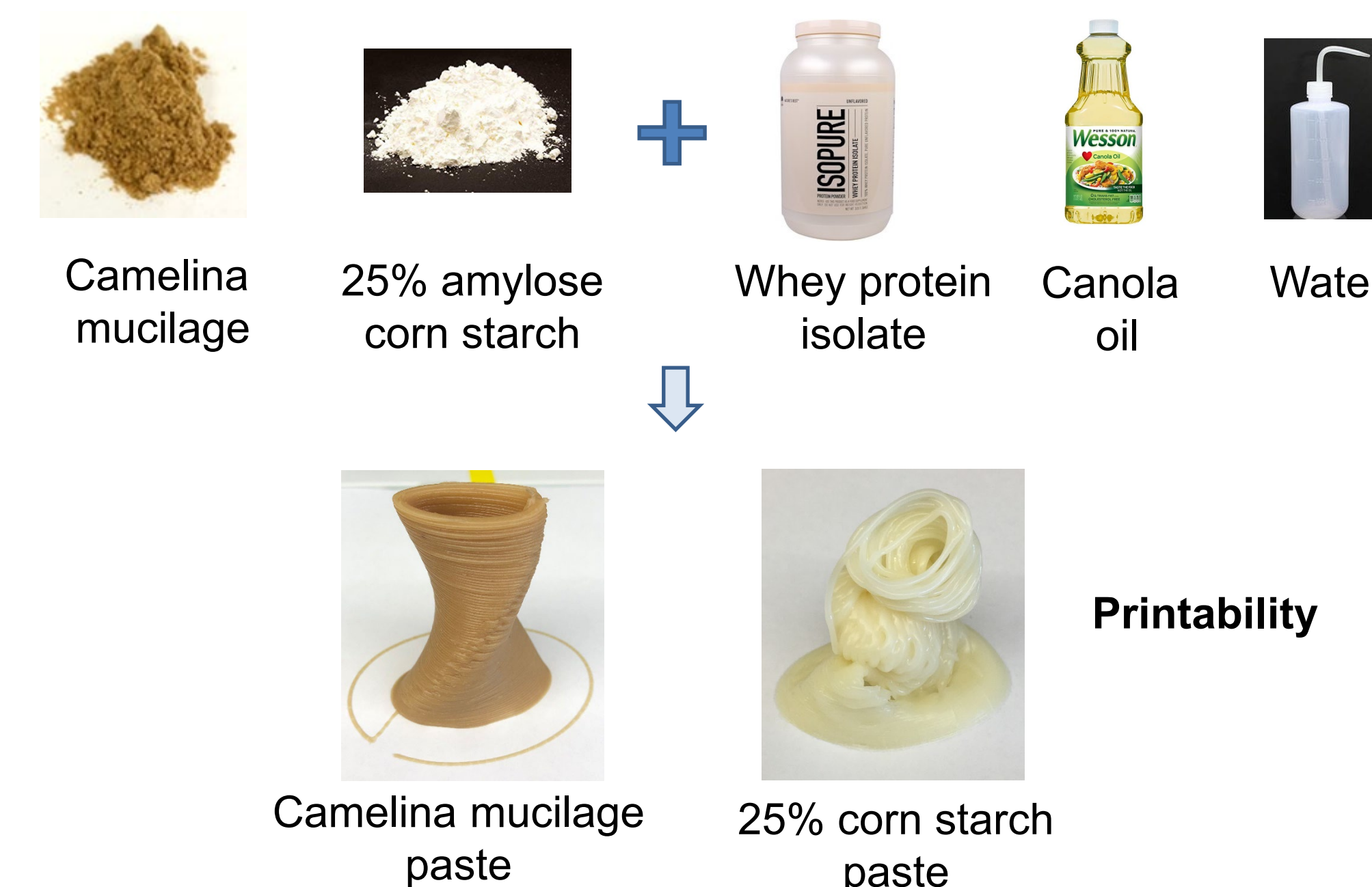


Chemical structure



Thermal stability

Camelina mucilage allows 3D printing of high-liquid oil pastes



(Liu and Ciftci (2021). Journal of Food Engineering, 288, 110135.)

Anticipated Outcome & Impact

- Camelina astaxanthin-rich oil is a novel bioactive-rich oil that improves oxidative stability of omega-3 camelina seed oil.
- Camelina mucilage is a novel food ingredient alternative to xanthan gum.
- Sorghum waxes is a novel natural food grade wax alternative to carnauba wax and candelilla wax that has the potential to minimize dependency of US for imported natural waxes.
- Camelina mucilage is a new ingredient for 3D food printing overcoming a critical challenge associated with 3D printing high-oil-content food pastes.

Acknowledgements