

Carotenoid Extraction from Ethanol Byproducts Using Pressurized Hot Water for Clean Nutrient Recovery

Pressurized hot water cleanly extracts lutein/zeaxanthin from ethanol byproducts—upcycling waste into vitamin-A-rich supplements without organic solvents.

Purdue researchers developed a technology to extract carotenoids from the corn bioethanol process using pressurized hot water. Carotenoids are red-orange-yellow pigments in plants and bacteria that act as antioxidants for humans when ingested, preventing disease and promoting health. Also, Carotenoids are converted into vitamin A, which is a nutrient extremely important for vision, cell growth, immune system, reproduction, among others.

Wet and dried distiller's corn grains remain a sub-product of ethanol. Those grains are rich in carotenoids like lutein and zeaxanthin, which are not water soluble, and the current method of extraction is using chemical solvents. The technology developed by Purdue researchers uses hot water and high pressure to extract those nutrients, being an effective and cleaner solution to upcycle carotenoids from bioethanol byproducts. The recovered lutein and zeaxanthin can be used on dietary supplements, providing health benefits such as preventing eye disease and protecting the skin from sun damage.

Technology Validation: Pressurized high-water extraction (PHWE) levers high pressures and temperatures to change solvent properties and force unlikely extractions such as the lutein and zeaxanthin (4.2 times more and 1.7 times more, respectively).

Advantages:

- Upcycling carotenoids
- Reducing waste
- Non-chemical process

Technology ID
2023-ENGL-70222

Category

Biotechnology & Life
Sciences/Bioprocessing &
Biomanufacturing
GreenTech/Circular Economy &
Waste Reduction
GreenTech/Environmental
Remediation & Pollution Control

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Applications:

- Dietary supplements
- Food enriched with Vitamin A
- Food Ingredients

TRL: 4

Intellectual Property:

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Utility Patent, 2024-04-04, United States

Keywords: carotenoid extraction,pressurized hot water,ethanol byproduct valorization,lutein recovery,zeaxanthin recovery,non solvent extraction,vitamin A enrichment,clean label ingredients,eye health supplements,skin protection nutrients,distillers grain upcycling,green extraction technology