Summary

Xanthohumol is a naturally occurring prenylated chalcone primarily produced by the lupulin glands in the female flowers of hops (Humulus Lupulus L.) and the trichomes on the underside of young leaves.

Xanthohumol possesses several fundamental properties, including anti-cancer, antibacterial, antifungal, and antiviral activities. It is a potent antioxidant that combats oxidative stress and supports the cardiovascular system by being used in treatments for ischemic heart diseases. Additionally, xanthohumol exhibits hepatoprotective effects, prevents skin aging, and delays the skin aging process.

The primary method of obtaining xanthohumol is isolation from natural sources. However, due to its low concentration, only 0.1-1% of the dry weight of hop cones, efforts have been made to synthesize it chemically to obtain larger quantities for further research and applications.

Based on this, the objective of the study was to develop a chemical method for synthesizing xanthohumol and to increase its stability by encapsulating it in γ-cyclodextrin.

A new synthesis method for xanthohumol was developed using naringenin as the starting compound. The developed synthesis consists of six steps with an overall yield of 19.8%. The synthesis method was scaled up to a 5-gram scale. Additionally, a deuterated xanthohumol analog (XN-d3) was synthesized based on the developed method for XN, with an overall yield of 23.3%. The MRM transitions of XN-d3 and its co-elution with XN make it a suitable internal standard in stable isotope dilution assays, which were used to determine XN content in two beers. Due to the spontaneous isomerization of xanthohumol to isoxanthohumol, XN was encapsulated in γ-cyclodextrin to increase its stability. Antioxidant activity tests demonstrated that XN has similar antioxidant properties to vitamin C, while the γ-CD-XN complex exhibited thirty times better antioxidant properties.