

## Study: Ginseng just got better -- not as bitter

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University of Illinois scientists have learned to mask the bitterness of ginseng, a common ingredient of energy drinks.

"Consumers like to see ginseng on a product's ingredient list because studies show that it improves memory, enhances libido and sexual performance, boosts immunity, and alleviates [diabetes](#). But the very compounds that make ginseng good for you also make it taste bitter," said Soo-Yeun Lee, a U of I associate professor of [food science](#) and human nutrition.

In an earlier study, Lee and U of I professor of [food chemistry](#) Shelly J. Schmidt found that ginseng contributes more to the bitter perception in energy drinks than caffeine, an indispensable component of these [beverages](#) and the very compound that sensory scientists use as their reference for bitter perception.

"Ginseng has over 30 bitter compounds, and scientists still don't know which compound or group of compounds is responsible for the bitter taste," Lee said.

While experimenting with five possible solutions to ginseng's bitterness problem, they discovered that cyclodextrins—hydrophobic compounds made of glucose molecules that occur in a ring form—were able to capture the bitter flavor compounds and reduce bitterness by more than half.

Lauren Tamamoto, a graduate student who worked on the study,

assembled a group of 13 non-smokers who also lacked allergies that would affect their bitter perception. Panelists had to be able to detect a chemical called 6-n-propyl-2-thiouracil (PROP) on a piece of filter paper (some people can, some people can't) and also pass basic taste tests for sweet, sour, bitter, and salty perceptions. They then participated in 12 training sessions and taste-tested 84 samples, rating each on a 16-point scale.

The researchers used the panelists to test these potentially effective bitterness-reducing treatments:

- adding a related complementary flavor (in this case, citrus) as a sensory distraction
- incorporating a bitterness blocking agent that neutralizes the taste buds
- using ingredient interaction (the scientists added large amounts of taurine because research indicated that it might be useful in blocking bitterness)
- utilizing an enzyme that would break down the peptide bonds of bitter components
- experimenting with complexation, or the use of cyclodextrins to form inclusion complexes with the bitter compounds, which masks the bitter taste

"Cyclodextrins were by far the most effective method of reducing the bitterness of ginseng solutions. We also found that gamma-cyclodextrins were more successful than beta-cyclodextrins and were more cost-effective," Schmidt said.

These compounds have been used to mask bitterness before, but not at the level of ginseng used in a typical energy drink, she said.

Lee and Schmidt intend to continue studying ginseng's bitterness compounds to learn which are most responsible for producing objectionable flavors, and to gain insight into exactly how these compounds interact with cyclodextrins.

That knowledge would facilitate the use of ginseng as a functional ingredient in [energy drinks](#) and allow their manufacturers to add health benefits to the beverages beyond general nutrition and the calories they provide, Lee said.

"The U.S. energy drink industry is expected to reach \$19.7 billion in sales by 2013, even though these beverages often have a medicinal taste because of their functional ingredients. If we can create more palatable products, manufacturers will be able to expand this market even further.

"But, beyond that, this new method for masking bitterness in ginseng gives food scientists an opportunity to improve the health of consumers," she said.

**More information:** The study was published in the September 2010 issue of the *Journal of Food Science*.

Provided by University of Illinois at Urbana-Champaign

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