

## Natural preservative breakthrough: Flavonoids produced from yeast hold vast potential, claim NTU researchers

16 Aug 2018 --- Nanyang Technological University, Singapore (NTU Singapore) scientists have discovered a plant-based food preservative that is said to be more effective than artificial preservatives. In tests carried out on meat and fruit juice samples, the organic preservative kept its samples fresh for two days without refrigeration, compared to commercial-grade artificial food preservatives.

The organic preservative comprises a naturally-occurring substance known as flavonoids, a group of phytonutrients found in almost all fruits and vegetables. The flavonoids created by NTU scientists have strong antimicrobial and antioxidant properties – two essential traits of preservatives that inhibit bacterial growth and keep food fresher for longer.

The experiment was conducted at room temperature where the other samples with artificial preservatives succumbed to bacteria contamination within six hours.



Scientists at NTU Singapore have discovered a plant-based food preservative that is more effective than artificial preservatives.

The NTU research team was led by Professor William Chen, Director of NTU's Food Science & Technology program. The team is already in talks with multinational companies to further develop the new food preservative, according to the university, although specific details about the potential companies involved are not being revealed until agreements have been signed.

Chen adds that the team was working on this for approximately two years.

"We are exploring this with the industry to enhance its efficacy and safety further. Our ultimate goal is for our discovery to be rolled out for use in all packaged food products," he tells **FoodIngredientsFirst**.

Chen also notes: "This organic food preservative is derived from plants and produced from food grade microbes, which means that it is 100 percent natural. It is also more effective than artificial preservatives and does not require any further processing to keep food fresh."

"This may open new doors in food preservation technologies, providing a low-cost solution for industries, which will, in turn, encourage a sustainable food production system that can produce healthier food that stays fresh longer," he explains.

### Harnessing nature's gifts

Flavonoids are naturally occurring chemicals in plants which are responsible for defending plants against pathogens, herbivores, pests and even environmental stress such as strong ultraviolet rays

from extended hours of sunshine. Found in almost all fruits and vegetables, they are responsible for inducing vivid colors in them. These include onions, tea, strawberries, kale and grapes.

Though flavonoids' antimicrobial potential have been reported, they have not been used as a food preservative because they require further processing before they can mitigate bacteria. This is known as prenylation – a process involving the addition of hydrophobic molecules onto a protein to facilitate cell attachment – which is not cost-effective or sustainable.



In tests carried out on meat samples, the organic preservative (pictured left) discovered by NTU Singapore scientists, kept its samples fresh for two days without refrigeration, compared to commercial-grade artificial food preservatives.

NTU researchers have not only found a way to grow flavonoids with high antimicrobial and antioxidant properties but also naturally and sustainably. They achieved this by implanting the flavonoid-producing mechanism from plants into baker's yeast (a species known as *Saccharomyces cerevisiae*).

Similar to how vaccines are manufactured using yeast, the researchers found that the yeast produced flavonoids with high antimicrobial properties, which are not even present in pure flavonoid samples extracted directly from plants.

Chen explains: "Antimicrobial and antioxidant properties are key elements in food preservation. Flavonoids extracted directly from plants need to be further processed to be antimicrobial whereas our flavonoids produced from yeast do not require this. Secondly, there have been no reports on antioxidant properties in flavonoids while our yeast-based flavonoids naturally come with it."

#### **Growing concern for artificial preservatives**

This new research comes at a time when there is a growing body of scientific evidence on how artificial preservatives affect the body's long-term growth and development.

Last month, the American Academy of Pediatrics, which represents some 67,000 pediatricians in the US, issued concerns about chemicals used in food preservatives for meat products. These include nitrates and nitrites, which can interfere with thyroid hormone production and has also been linked with gastrointestinal and nervous system cancers.

Sharing an independent view on the research, Dr. Gabriel Oon Chong Jin, a Consultant Medical Oncologist at Singapore's Mount Elizabeth Hospital, says: "The new source of natural food preservatives from flavonoids safely produced from yeast by NTU is brilliant, as this species of yeast has been used in brewing beer and in the manufacture of hepatitis B vaccines."

Dr. Oon, a former consultant and adviser to the World Health Organisation (WHO) and a pioneer in implementing the universal vaccination program in Singapore, adds: "Flavonoids are important natural food supplements with vitamins, but also used as food additives, without causing harm to the human system. This is unlike currently available artificial preservatives used in most processed foods such as aspartame and nitrates, which may cause cancer among other adverse health effects."

**By Elizabeth Green**

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