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Secrets of edible bird nest

Edible bird nest is the most highly priced agricultural product of South-East Asia. What is edible bird nest really?

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Edible bird nest (EBN) is one the most highly valued of the food products of South East Asia. The nest is made by certain species of swiftlets with a high-protein glutinous secretion produced by their salivary glands. The secretion hardens on exposure after the bird has shaped it into a cup-shaped nest. The secretion also serves to glue the nest to the ceiling of the cave or building in which the birds live.

There are more than 24 species of swiftlets, but only a few produce nests that are deemed edible. The high-protein secretion used in forming the nest is produced by a pair of large salivary glands under the tongue. The birds mate and raise their young in the nest.

The majority of EBN traded worldwide comes from two heavily exploited species, the White-nest swiflet (*Aerodramus fuciphagus*) and the Black-nest swiflet (*Aerodramus maximus*) Their habitats range from the Nicobar Islands in the Indian Ocean to sea caves in the coastal regions of Thailand, Vietnam, Indonesia, Borneo and the Palawan Islands in the Philippines. Malaysia is situated right at the heart of the 'golden triangle' of swiftlet bird nest production, making it a strong producer in this industry. EBN has been used for centuries in China. Commonly referred to as the 'Caviar of the East' it fetches a premium price.

The swiftlet 'Golden Triangle'

Traditionally, EBN is double boiled with rock sugar to make a delicacy known as 'bird's nest soup'.The Chinese name for bird's nest soup, *yan wo* translates literally as 'swallow's nest'. This soup is especially valued by the Chinese and Vietnamese for its reputed health benefits. The nests were first traded in China during the Tang Dynasty (618-907 A.D.). There are historical sources stating that between the years 1368 and 1644, Admiral Cheng He introduced bird nests to the imperial court of the Ming Dynasty. Borneo was the major source of bird nests and these were traded for Chinese stonewares and procelain, iron, brass, gold, glass beads and textiles.

Traditional edible bird nest soup

Edible bird nest is not just a pleasant food to be consumed and enjoyed; it is also traditionally believed to provide health benefits, such as aiding digestion, raising libido, improving the voice, alleviating asthma and improving concentration.

Nutritional and functional properties

More than half of EBN's weight consists of protein. According to Marcone (2005), the composition of bird nest is: lipid 0.14 - 1.28%, ash 2.1%, carbohydrate 25.62 - 27.76% and protein 62 - 63%. The major nutrient components of EBN are glycoproteins (Kathan & Weeks, 1969) rich with amino acids, carbohydrate, calcium, sodium and potassium (Norhayati *et al*., 2010) and abundant sialic acid-containing sugar chains (Kakehi *et al*. 1994) This unique glycoprotein structure in EBN makes it different from other protein sources such as chicken and fish in term of solubility, functional properties and bioactive compounds. The glycoprotein in bird's nest contains about 9% sialic acid, 4.19 to 7.2% galactosamine, about 5.3% glucosamine, 5.03 to 16.9% galactose, and about 0.7% fucose (Kathan and Weeks 1969, Tung *et al*. 2008). The most abundant amino acids are serine, threonine, aspartic acid, glutamic acid, proline, and valine (Kathan & Weeks 1969). The nutrient content of EBN may be affected by seasonal variations and even breeding sites (Norhayati *et al*, 2010). Edible bird nest contains a common 77 KDa protein that has properties similar to those of the ovotransferrin protein in eggs. This protein may be partially responsible for the allergic reactions that sometimes occur among young children who consume edible bird's nest products.

Many people question whether bird nest soup is really nutritious and therapeutic. Studies by the Innovation Centre of Food Technology (MANIS) Universiti Kebangsaan Malaysia (UKM) indicate that bird nest soup has the highest antioxidant and antihypertensive activities compared to chicken and fish (*haruan*) soups.

Our research has shown that bird nest is best cooked within a period of two to four hours. However, the optimum time for cooking EBN is about two hours. It is important not to overcook, so that its functional biological properties are retained.

Edible bird nest before cleaning

Processing the nests

In the industry, the nests are cleaned by soaking them in water until the nest is softened and the tightly bound strands partially loosened. Small feathers and fine plumage are then manually removed with tweezers. The cleaned strands are then re-arranged and molded into chips of various shapes, air-dried, and packaged for sale around the world.

Cleaned edible bird nest

Market demand

While the primary market is the Chinese community around the world, mainly China, Taiwan, Singapore and North America, there are new emerging markets such as Middle East, Japan and Korea. The demand is amplified during Chinese festivals, such as the Lunar Spring Festival (Chinese New Year), when gifts of bird's nest are synonymous with wealth and good fortune.

Bird nest is either sold in its original state after harvesting or in processed form after going through the demanding process of removing birds' feathers and cleaning. Concerns have arisen over the purity and authenticity of the product, and the authorities in China have been enforcing more stringent screening of the processed nests. There is now a growing need to establish a standardized benchmark and quality assurance system to ensure that

Freeze-dried edible bird nest hydrolysate the edible bird nest products from Malaysia are genuine and safe for consumption.

Edible bird nest in the retail market

Production of edible bird nest

Bird nests were formerly harvested from caves, principally the enormous limestone caves at Gomantong and Niah in Borneo. With the escalation in demand, these sources have been overtaken since the late 1990s by purpose-built nesting houses. At first, disused shop houses and cinemas were converted into artificial cave habitats but knowledge of what the birds prefer has improved to the point that the birds are now enticed to nest in specially designed reinforced concrete housing provided with the appropriate light, humidity, security and other features. These nesting houses are normally found in urban areas adjoining the sea, since the birds have a propensity to flock in such places. Many people have invested heavily in hopes of attracting the swiftlets to nest. Before 1998, there were about 900 swiftlet farms throughout Malaysia. Five years later, the number of swiftlet farms throughout the country was close to 36,000 units, with an average annualized growth rate of 35% (Hameed, 2007).

The main export markets of EBN are Hong Kong (50%), China (8%), Taiwan (4%) and Macau (3%) with estimated consumption of 160 tons per annum. In Hong Kong a bowl of bird nest soup could cost $30 to $100 USD while a kilogram of white nest (around 90 to 120 nests) can cost up to $2,000 USD. A kilogram of "red blood" nest can cost up to $10,000 USD in Hong Kong and China. As more bird nest products are developed, such as beauty and skincare products as well as health products, the future of the bird's nest industry looks very promising.

According to Kuan and Lee (2005), Malaysia is the world's third largest supplier of bird's nest after Thailand and Indonesia, contributing 10 percent of the 210 tonnes, worth up to $4 billion US dollars, consumed annually by top buyers in China and Taiwan. According to the Malaysian Federation of Bird's Nest Merchants Association, Malaysia's annual production of bird's nests has reached 1 billion ringgit (290 million U.S. dollars) in value. However, the industry suffered a setback in the past two years after China banned imports of the nests, citing health concerns over the content of nitrites in some products. The ban by China has caused prices to drop at least 20 per cent. But producers say that China's import ban could turn out to be a much-needed wakeup call for better quality control.

In the 1990s, the first comprehensive reports on authentication of EBN were published. These reports demonstrated the possibility to use scanning electron microscopy, energy dispersive X-ray microanalysis, flame atomic emission spectroscopy, inductively coupled plasma-atomic emission spectroscopy, ultraviolet-visible spectroscopy and other physico-chemical techniques to determine the authenticity of edible bird's nest. Recently, a China-based research team developed a simple but accurate and reliable spectrophotometry method to determine EBN content. The method is based on the reaction between N-acetylneuramic acid and ninhydrin in acid solution. The method evaluates the internal content of N-acetylneuramic acid, a nine-carbon sugar which is one of the components in edible bird nest.

FOR MORE INFORMATION

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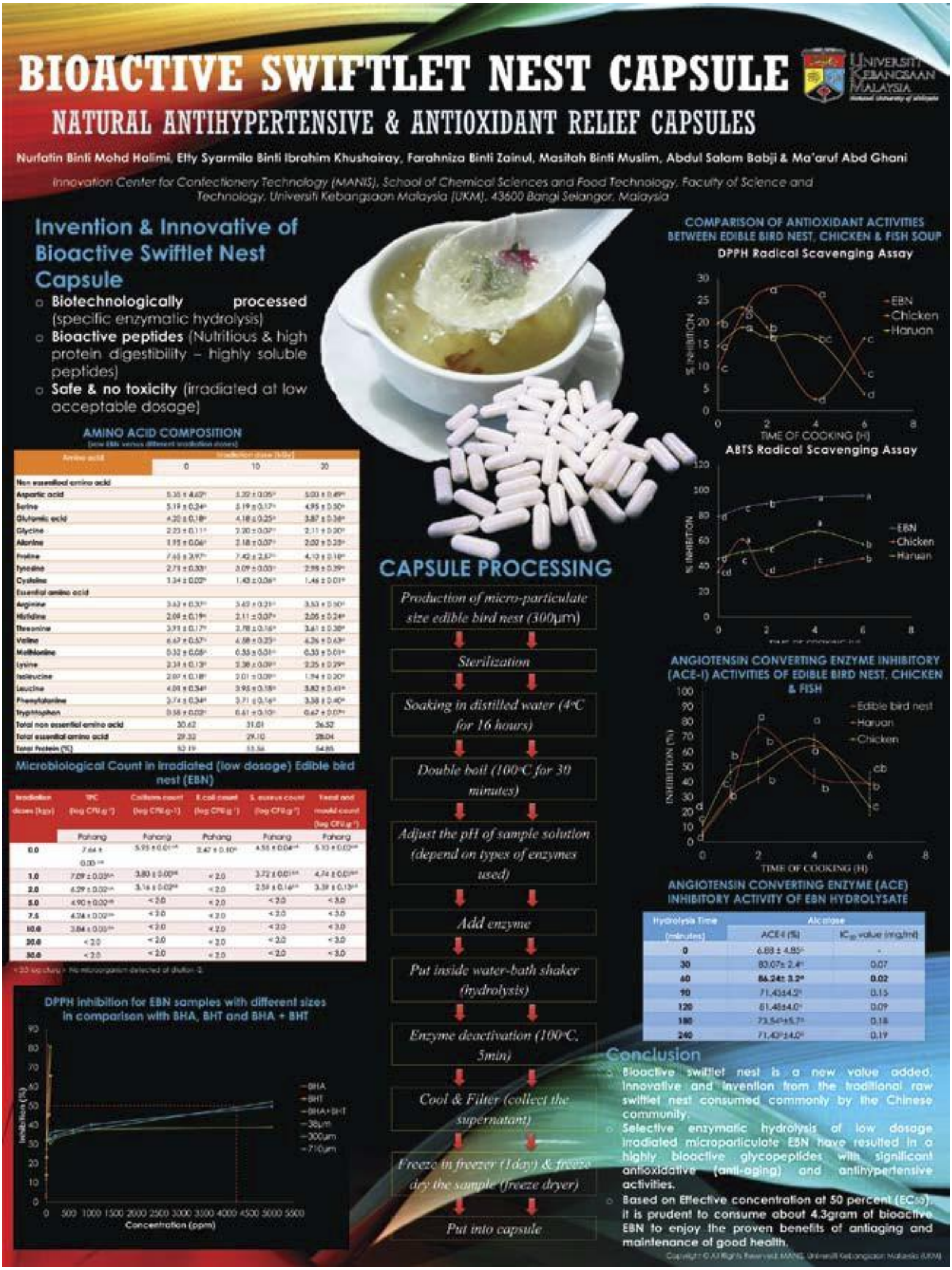
BIOACTIVE SWIFTLET NEST CAPSULE
NATURAL ANTIHYPERTENSIVE & ANTIOXIDANT RELIEF CAPSULES
Nurfatin Binti Mohd Halimi, Etty Syarmila Binti Ibrahim Khushairay, Farahniza Binti Zainul, Masitah Binti Muslim, Abdul Salam Babji & Ma'aruf Abd Ghani
Innovation Center for Confectionery Technology (MANIS), School of Chemical Sciences and Food Technology, Faculty of Science and Technology, Universiti Kebangsaan Malaysia (UKM), 43600 Bangi Selangor, Malaysia
Invention & Innovative of Bioactive Swiftlet Nest Capsule
Biotechnologically processed (specific enzymatic hydrolysis)
Bioactive peptides (Nutritious & high protein digestibility – highly soluble peptides)
Safe & no toxicity (irradiated at low acceptable dosage)
AMINO ACID COMPOSITION
Microbiological Count in Irradiated (low dosage) Edible bird nest (EBN)
DPPH inhibition for EBN samples with different sizes in comparison with BHA, BHT and BHA + BHT
Concentration (ppm)
CAPSULE PROCESSING
Production of micro-particulate size edible bird nest (300µm)
Sterilization
Soaking in distilled water (4°C for 16 hours)
Double boil (100°C for 30 minutes)
Adjust the pH of sample solution (depend on types of enzymes used)
Add enzyme
Put inside water-bath shaker (hydrolysis)
Enzyme deactivation (100°C, 5min)
Cool & Filter (collect the supernatant)
Freeze in freezer (1day) & freeze dry the sample (freeze dryer)
Put into capsule
COMPARISON OF ANTIOXIDANT ACTIVITIES BETWEEN EDIBLE BIRD NEST, CHICKEN & FISH SOUP
DPPH Radical Scavenging Assay
ABTS Radical Scavenging Assay
TIME OF COOKING (H)
EBN
Chicken
Haruan
ANGIOTENSIN CONVERTING ENZYME INHIBITORY (ACE-I) ACTIVITIES OF EDIBLE BIRD NEST, CHICKEN & FISH
Edible bird nest
Haruan
Chicken
ANGIOTENSIN CONVERTING ENZYME (ACE) INHIBITORY ACTIVITY OF EBN HYDROLYSATE
Hydrolysis Time (minutes)
Alcalase
ACE-I (%)
0 6.88 ± 4.85
30 83.07± 2.4 0.07
60 86.24± 3.2 0.02
90 71.43±4.2 0.15
120 61.48±4.0 0.09
180 73.54±5.7 0.18
240 71.40±4.0 0.19
Conclusion
Bioactive swiftlet nest is a new value added, Innovative and invention from the traditional raw swiftlet nest consumed commonly by the Chinese community.
Selective enzymatic hydrolysis of low dosage irradiated microparticulate EBN have resulted in a highly bioactive glycopeptides with significant antioxidative (anti-aging) and antihypertensive activities.
Based on Effective concentration at 50 percent (EC50), it is prudent to consume about 4.3gram of bioactive EBN to enjoy the proven benefits of antiaging and maintenance of good health.