Functional Properties of Propolis in Natural Products

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Utilization for function property of plants

Plants are an important source of food for many animals, such as insects, snails, and many vertebrates, because of their protein and carbohydrate content. Since plants cannot run away, they have had to evolve strategies, that make them indigestible or poisonous, to protect themselves from being eaten. In addition to *primary metabolites*, such as carbohydrates, amino acids, fatty acids, cytochromes, chlorophylls, and metabolic intermediates of the anabolic and catabolic pathways, which occur in all plants and where they all have the same metabolic functions, plants also contain a large variety of substances, named *secondary metabolites*, with no apparent direct metabolic function. Certain secondary metabolics are restricted to a few plant species, where they fulfil specific ecological functions, such as attracting insects to transfer pollen, or animals to consume fruits and in this way to distribute seed, and last, but not least, to act as *natural pesticides*.

Plant agricultural production is the basis for human nutrition. Plant gene technology, which can be regarded as a section of plant biochemistry, makes a contribution to combating the impending global food shortage due to the enormous growth of the world population. The use of environmentally compatible herbicides and protection against viral or fungal infestation by means of gene technology is of great economical importance. Plant biochemistry is also instrumental in breeding productive varieties of crop plants.

Plants are the source of important industrial raw material such as fat and starch, but they are also the basis for the production of pharmaceuticals. It is to be expected that in future gene technology will lead to the extensive use of plants as a means of producing sustainable raw material for industrial purpose.

Recently, propolis is used variously for healing disease and health food by many people, especially beekeepers in Korea. More people will use more propolis as a substitute medicine since it is known that a wide variety of biological and pharmacological activities and functional property.

Ⅰ. Propolis

Honeybees gather propolis, a resin, from tree bark and leaves. They combine this resin with nectar, creating a mix of wax, pollen and bee bread. They then use this substance to seal their hives, protecting it from outside contaminants. They also use propolis at the entrance to the hive to sterilize themselves as they come and go.

Ⅱ. The origin of propolis

The final product, as we find it in nature (in the beehive) has a vegetable origin: resins, balsams, pollens and waxes constitute more than 70% of the final product called propolis. This part, which we call "base", is integrated by other products of animal origin which are the glandular secretions of bees, in particular different waxes and enzymes with solvent and moulding functions. There are many plants which produce, for quality and quantity of balsamic substances produced, an interesting source of harvesting for their lifes.

We could mentioned which the principal plants which produce as follows:

- Populus (various species), Betula (various species), Salix (various species), Aesculus Hippocastanum L., Picea e Pinus (various species), Abies (various species), Quercus (various species, Ulmus (various species), Alnus (various species), Prunus (various species), Fraxinus excelsior L.

III. Propolis harvest

Usually bee collect the propolis when the temperate reach maximum sunny day of season because these substance become more resinous are smooth to aspirator. Beekeepers, with a rational apiculture can control, within certain limits, the production of this precious product of honeybees and obtain, not only interesting quantities of propolis but, first of all, a product of excellent quality. Bees collect sap and resin from various types of trees like poplar, birch, elm, conifer (especially pine) and oak, and plants. The most classic system is scratching propolis by the movable parts of the beehive: little looms (or honeycombs), covers, etc.; one of the most rational system is using a harvesting grate.

IV. Composition of propolis

As propolis is a natural product, its composition is rather complex and extremely variable, as it depends upon a lot of factors tied to the habitat where the product itself is elaborated. Flavonoids are polyphenolic compounds that are present in plants. They have been shown to possess a variety of biological activities at non-toxic concentrations in organisms. Galangin, a member of the flavonol class of flavonoid, is present in high concentrations in medicinal plants (e.g. Alpinia officinarum) and propolis, a natural beehive product.

V. Microanalysis of the substance (medium values)

Resins and balsams: 50-55%; propolis waxes: 30-35%; pollens: 5%; aromatic. acids: more than 5%; essential oils: less than 2%; residue of not connected substances: 5%. Among the substances which characterize propolis biological activity, the most important are those of phenolic nature. This sticky, brown resinous substance is collected by honeybees from various plants and mixed with wax. Used to sterilize their home against infection, bees also use propolis as a multi-purpose cement and varnish. Propolis contains approximately 55% resins and balms, 30% wax, 10% etheric oils and 5% pollen. Rich in amino acids and trace elements, it also has a high vitamin content, including the valuable bioflavonoids, Vitamin K. Its these basic

ingredients that give propolis its dynamic bacteria-destroying power, some of the best originating from North America.

Ⅵ. The origin of the use for propolis

It is well known that Hippocrates belived the father of medicine, prescribed the use of propolis to help heal sores and ulcers, internally and externally. Unlike penicillin or other drugs, propolis is always effective, because bacteria and viruses cannot build tolerances against propolis. This has been clinically verified after its use in more than 16,000 situations.

Ⅶ. Ancient healer

While propolis is just now enjoying a rediscovery, its usefulness can be traced back to the time of Hippocrates, who used it to heal sores and ulcers, internally and externally. Through the ages historical documents record its use. Culpepper's Complete Herbal refers to ointments of propolis for inflammation and fever. In WWII, it was used by the Soviet Union to treat battle wounds. Propolis is an excellent natural antibiotic and immune system booster.

Ⅷ. Active compounds

From "Bee Pollen, Royal Jelly, Propolis, and Honey," by Rita Elkins, M.A. Dr. K. Lund Aagaard who is considered a well qualified authority on propolis has said, "Nineteen substances of different chemical structure have been identified so far." These compounds include a number of substances which belong to the flavonoid family including betulene and isovanillin. Propolis contains 500 more bioflavonoids (vitamin P) than is found in oranges. Except for vitamin K, Propolis has all of the known vitamins. Of the fourteen minerals required by the human body, propolis contains them all with the exception of sulfur. Propolis is comprised of 50 percent to 70 percent resins and balsams, 30 percent to 50 percent wax, 5 percent to 10 percent Bee Pollen and 10 percent essential oils. Like Royal Jelly and Bee Pollen, propolis also contains a number

of unidentified compounds which work together synergistically to create a perfectly balanced, nutritive substance. Sixteen amino acids have been identified in propolis.

Bees make a large use of this product, so that propolis has to be considered as an indispensable element for the survival of the colony itself. This resin is sufficiently malleable at a temperature of about 35℃, which is the room temperature of the beehive. At lower temperatures, it becomes harder and more rigid. Another important quality of propolis is that it can hardly be damaged by water. Thanks to its properties propolis accomplishes different mechanical functions inside the beehive: in fact, it is used by bees to close undesirable or accidental openings which might spoil room temperature and stability of the nest; it is also used to fix all movable parts inside the beehive, as thermic insulator, to raise protective barriers in front of the entrance of the beehive (by which the name of propolis). Propolis has also a great bacteriostatic power, able to regulate the bacteric energy inside the beehive, establishing a perfect biological balance.

IX. Vitmain and mineral content

From "Bee Pollen, Royal Jelly, Propolis, and Honey," by Rita Elkins, M.A. According to researchers at the second leningrad scientific conference on the application of apiculture (bee culture) in medicine, bee propolis is rich in:

vitamin A (carotene), vitamin B_1, vitamin B_2, vitamin B_3, biotin, an array of bioflavonoids, albumin, calcium, magnesium, iron, zinc, silica, potassium, phosphorus, manganese, cobalt and copper.

X. Nature's penicillin

Synthetic antibiotics carry with them side effects - propolis, a natural antibiotic, has no such side effects.

XI. Functional effect of propolis

Propolis is a natural substance produced by bees to strengthen and protect their hive from bacteria, germs and foreign invaders. Propolis contains vitamins B_1, B_2, C and E, all the essential minerals, amino acids and powerful flavonoids. "Propolis is antiseptic, anti-fungal, antibacterial and anti-microbial." There were remarkable quantitative and qualitative difference in the flavonoids in propolis (Koo & Park, 1997). Propolis contained the same major flavonoids, pinocembrin, chrysin, galangin, and pinobanksin (Siess et al., 1996). There was found a remarkable quantitative and qualitative difference of flavonoids in propolis (Koo & Park, 1997). Propolis produced from a bee have many components that accomplish antifungus (Matsuno, 1992; Takino, 1982), anti-cancer (Chiao et al., 1995) and anti-oxidant (Erben-Russ et al., 1987; Takahama et al., 1984). It also plays an important role in the metabolism of a cell. Applied externally to help disinfect sores, acne, cracked lips, and many other skin complaints. Bee propolis is the strongest natural disease-fighter in nature!

Propolis is a resinous hive product collected by honeybees from various plant sources. It is extensively used in food, beverage and in folk medicine for treating various ailments and reported to have broad spectrum of biological activities. Hepatoprotective and anti-helicobacter pylori activities of constituents from propolis.

XII. Summary

1. After 8 weeks of storage, TBARS, VBN and POV values of sausages treated with 0.3% EEP, 0.4% DREEP, 0.2% PS and 0.3% WEP at 4℃, respectively, lower than that of the control samples.
2. The antioxidative effect of boiled WEP was stronger than room temperature WEP.
3. The results show that materials with low boiling point contain strong antioxidant compounds.
4. EEP, WEP and DREEP can serve as good chemical preservatives of pork meat products and can promote human health because they are naturally produced.

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