Functional and Biological Properties of Bee Products

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What is the function of the bee products for nutrition and health?

- **Honey**: medicine or food supplement
- **Pollen**: food, functional food
- **Bee venom**: medicine
- **Wax**: cosmetic or food supplement
- **Royal jelly**: medicine or food supplement
- **Propolis**:
Nutrition
Coverage of the Recommended Daily Intake
Intake of 20 g honey per day

- Ca. 3 % proteins and amino acids, minerals, acids, aroma compounds, polyphenols
- 17 % Wasser
- 80 % carbohydrates

Minerals:
- Selenium: 10 – 40 %
- Chromium: 2-4 %
- Copper: 1-16 %

Carbohydrates:
- ca. 3 %
- Rest: < 1 %

Wide variation of RDI coverage, depending on the botanical origin of honey

Bee Product Science, www.bee-hexagon.net
Glycemic Index

After Foster-Powell 2002; Arcot and Brand-Miller 2005
Pollen
Nutrition and % RDI, intake 15 g

Main nutrients

**crude fibres** ca. 0.1 - 10

**Carbohydr.**

Minerals

K: 5-27, Mg: 2-23, Zn:10-79, Mn:15-85, Fe: 2-37, Cu: 4-36

**Water**

**5% fat**

**20% protein**

Vitamins:

**Pro-Vit A**: 30-600, **E**: 8-66, **B¹**:15-32, **B²**:12-43, B3: 7-20, **B6**: 4-13, **Folic acid**: 20-67, **H**: 30-42

Wide variation of RDI coverage, depending on the botanical origin of pollen
Royal Jelly
Nutrition and % RDI, Intake 1 g /day

Main nutrients:
all below 0.5 %

Minerals:
all below 0.5 %

Vitamins:
B3: 3-15, H: 2-18 %

Nutrient contribution very small
Beeswax as a natural food additive E 901

allowed as additive for

- Sugar and chocolate products
- Nuts
- Coffee grains
- Cover of apples, pears, peaches, ananas, melons, and oranges
- Basis of chewing-gums
- Support for food colorants
### Biological and Functional Effects in cell cultures and animal experiments

<table>
<thead>
<tr>
<th>Product</th>
<th>Biological Effect</th>
<th>Functional effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honey, pollen, royal jelly</td>
<td>antibacterial, fungicide, antiviral</td>
<td>Growth inhibition of von pathogen bacteria, fungi und viruses</td>
</tr>
<tr>
<td>Honey, pollen, royal jelly</td>
<td>antioxidativ, immuno-modulating and immuno-activating, anti-inflammatory</td>
<td>anti-cancer, stimulate immune difference against inflammation</td>
</tr>
<tr>
<td>Pollen, Royal jelly</td>
<td>radio-protective, anti-arteriosklerotic, enhances Ca absorption</td>
<td>Protects against radiation atherosclerosis and osteoporosis</td>
</tr>
<tr>
<td>Honey</td>
<td>prebiotic (oligosaccharides) probiotic (contains probiotic bacteria)</td>
<td>Stimulates healthy digestion by promoting the growth of good intestine bacteria (Bifidus, etc)</td>
</tr>
<tr>
<td>Royal jelly</td>
<td>increases reproduction and oxygen uptake of cells and has an effect on central and peripheral nervous system</td>
<td>Stimulating and energising, against stress and fatigue, protection of the central nerve system</td>
</tr>
<tr>
<td>Royal jelly</td>
<td>antihypertensiv, vasodilatativ</td>
<td>Cardio-protective</td>
</tr>
</tbody>
</table>
Nutritional and Functional Properties: Conclusions

Honey and pollen can be regarded as functional food, Royal jelly is rather a dietary supplement with functional properties.

Next step: Registration of specific health claims for labelling of bee product nutrients.
Propolis, Wax, Bee Venom

- Honey
- Pollen
- Royal jelly
- Wax
- Propolis
- Bee venom

- medicine
- Cosmetic, food supplement
- medicine, food supplement

Bee Product Science, www.bee-hexagon.net
Propolis

Popplar

Baccharis
Propolis

Ca. 2% nutrients
(CH, Prot. AA)

Non-nutrients: 98 %
Resins, beeswax, ess. oils

Pure food components neglectable in all propolis types
Specific composition depends on the botanical source

Propolis is not a food.
Dietary supplement? Medicine?
Biological and Therapeutical Effects in cell cultures and animal experiments

- antibacterial, synergistic effect on antibiotic potency
- fungicide, antiviral, antiparasitic
- anti-inflammatory
- Anti-oxidative, radio-protective
- immuno-modulating, anti-cancer
- local anaesthetic, anti-spasmolytic
- liver-protective and liver-detoxacating
- improves blood circulation, anti-coagulant
- tissue-regenerating

Most of the above effects are similar in both popplar and green propolis
Beeswax
Properties and Uses

- builds stable immulsions, improves water binding of creams
- improves soap function, gives a protective film on skin and improves its elasticity
- ingredient of creams and lotions for skin and lip care
- improves protective action of sun creams, does not provoke allergy
- antibiotic effect, warming properties
Bee Venom
Positive and negative biological effects in cell cultures and animal experiments

- anti-inflammatory, anti-rheumatic, pain-soothing
- anti-cancer
- radio-protective
- immuno-activating (high Doses)
- immuno-modulating (small doses)
- hemaglobin promoting, anti-coagulant, increases heart puls, blood circulation and blood pressure, lowers cholesterol content
- causes inflammation and pain
- toxic for cells, can block respiration
- allergenic

Negative effects are minimal when applying BV at therapeutic doses!
Allergy

✓ with the exception of BV incidence is similar to other food products or natural medicine
✓ Cases of allergy reactions after royal jelly
✓ Propolis provokes contact allergy
✓ Bee venom is allergenic

Contamination

main source is beekeeping: Good Apicultural Practice
Health Enhancing Effects
in cell cultures and animal experiments

✓ All bee products have promising health enhancing effects
✓ Food with functional properties: honey, pollen
✓ Dietary supplement: royal jelly and propolis
  Food supplement: beeswax, propolis
✓ Specific health claims for the above are possible
✓ Medicine: Bee venom, propolis:
✓ There is wide biological variation of the composition and
  properties of honey, pollen and propolis. Standardisation
  is necessary for registration as medical drugs
At least 6 times thanks to the bees and their wonder hexagon!

- Honey
- Pollen
- Bee Venom
- Wax
- Royal Jelly
- Propolis