ApiHealth: Improving the professional development opportunities in the Apitherapy sector in terms of health

APIHEALTH HANDBOOK

This handbook aims to provide agriculture and food engineers, medical staff, beekeepers, and the related professional groups with relevant information about the use of the products of the hive for health and promote and demonstrate scientifically the effects of these products.

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ApiHealth: Improving the professional development opportunities in the Apitherapy sector in terms of health

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Introduction

Honey is important for beekeepers, but beekeeping is not limited only within honey production. Today, bee products including propolis, royal jelly, and bee pollen are popular, traditional healthy food products; the use of bee products in the health sector is called apitherapy.

Apitherapy is a growing sector and a fascinating one as well. The purpose of this Handbook, implemented within ERASMUS+ project APIHEALTH, is to help understand and provide knowledge about apitherapy by providing advanced but easy-to-understand content; It aims to provide agriculture and food engineers, medical staff, beekeepers, and the related professional groups with relevant information about the use of the products of the hive for health and promote and demonstrate the effects of these products.

In the following chapters you will find training content, divided into individual modules, Good practice examples related to specific bee products and Glossary with terms used in the handbook content.

This Handbook is available in 7 languages: English, Slovak, Bulgarian, Polish, Romanian, Spanish and Turkish, both in electronic (e-book) and printed form.

To take full advantage of all the educational opportunities offered by the ApiHealth project, you can visit and register on the e-learning platform https://learn.apihealth.eu/, or visit the project website www.apihealth.eu.

1. Definition and Description of Apitherapy

What is Apitherapy?

Apitherapy (from the Latin word apis meaning "bee") is the medicinal use of products manufactured by bees. Bee products include honey, pollen, beeswax, propolis, royal jelly and bee venom. Some of the conditions treated are: multiple sclerosis, arthritis, wounds, pain, gout, shingles, burns, tendonitis, and infections. Great philosophers and doctors like Aristotle and Hippocrates were fascinated by hard-working bees. They built hives for them to be able to explore their complex community and collect honey for their own consumption needs. One of the oldest uses of honey (the first traces date back to 2500 BC) used to this day is the treatment of skin wounds and burns. The ancient Egyptians used honey in many different drugs. There is a document containing instructions for dressing consisting in applying honey directly to the damaged part of the body and wrapping it with a cloth. Honey was used on open wounds, cut wounds, burns, or ulcers to dry the wound and effectively heal it by creating a barrier that prevents further infection. The wounds healed, leaving only small scars. Many of the properties of honey can contribute to its ability to fight infection and promote healing. The high sugar content "pulls" inflammation and accumulates fluid from the wounds by osmosis. Honey prevents the growth of bacteria due to the acid reaction and enzymes that produce small amounts of hydrogen peroxide (hydrogen peroxide). Its ability to hold moisture around the wound accelerates healing and prevents

scarring. Honey also contains ingredients from plants used by bees to produce it, and it is speculated that some of these ingredients may further support wound healing and the antibacterial effect of honey. The pasteurization process, which is used to sterilize honey for sale, destroys the enzyme involved in the production of hydrogen peroxide, weakening the antibacterial effect of honey and depriving it of all medicinal properties.[1]

Why Do We Need Apitherapy?

There are many reasons why we need apitherapy: each of us was, is, or may be sick one day. Our family members or friends may also be in the same situation and may need our help:

- Disease prevention is much easier than treatment;
- Classic treatment based only on chemical treatments usually has too many side effects;
- Bee products are extremely rich in nutrients and delicate active substances that can effectively protect our health against over 500 diseases; among all professions, beekeepers are the second professional group who live the longest; they are usually strong and have many friends throughout their lives. Why?

Because they are regularly "treated" by their bees with their good, natural food, and stimuli. Probably the most important issue associated with apitherapy is that this treatment method known for thousands of years can increase your general knowledge and can help you help other people in need.

[1] https://ekoprzygoda.pl/newsy/141-apiterapia-co-robia-pszczoly-dla-nas

General Importance of Bees and Bee Products for Animals and Humans

Bees and beekeeping improve human existence in almost every country on earth. Honey and other products obtained from bees have long been known to every society. Bee species, their use, and beekeeping practices vary significantly from region to region. In many parts of the world, significant amounts of honey are still obtained by plundering wild bee families while, in others, beekeeping is practiced by highly qualified individuals. Beekeeping is an ancient tradition, and bees have been bred in Europe for several millennia. Bees are extremely important for the environment: they maintain biodiversity by pollinating a wide range of crops and wild plants. They contribute directly to human well-being by producing honey and other food as well as food additives such as pollen, wax for food processing, propolis for food technology, and royal jelly as a dietary supplement and food ingredient.

The United Nations Food and Agriculture Organization (FAO) estimates that, of the 100 plant species that provide 90% of the world's food, 71 are pollinated by bees. The existence of most plants grown in the European Union depends on pollination by insects. Pollination is fundamental to maintaining biodiversity. The annual monetary value of pollination is estimated to be hundreds of billions of euros. Aristotle called honey the nectar of the gods. Over the centuries, honey, bee pollen, propolis and royal jelly have been appreciated as both food and medicine. Science now confirms this ancient wisdom.

2. Advantages of Apitherapy for Humans and Animals

Revised Definition of Apitherapy. Types of Hive Products

Modern apitherapy refers to the use and consumption of bee products including bee venom. The current definition of most commonly accepted apitherapy is "The use of products derived from bees as medicine, including bee venom, honey, pollen, and royal jelly." Products derived from hives are:

Honey

Sugared substance produced by bees from the nectar they collect from the flowers in their environment. It is their staple food and, through it, they acquire energy to develop the activities of the colony.

What Is It for?

It is a source of calories for humans and it has different food, medicinal, and cosmetic uses.

Wax

The bees use it to build honeycombs on which the queen will deposit the eggs, where the bees will store the honey and pollen, and to cover the cells with larvae until they are born. The raw material to produce wax is honey and bees need to consume 6 to 7 kilos of honey to produce a kilo of wax.

What Is It for?

We humans use it to make candles, oils, crayons, handicrafts, in general, and in beauty products and therapeutic treatments. (This product is widely explained in module 3 of this manual).

Royal Jelly

It is a substance that young bees secrete to feed the larvae during their first three days of existence, and the queen throughout its life. The raw materials necessary for its elaboration are pollen, honey, and water.

What Is It for?

As food, it is rich in vitamin B and it is also used for masks, shampoo, circulation pills, and cold creams.

Propolis

It is a resin that bees collect from the trunk of some trees. It is very important for the hive since, through it, they ensure warmth and hygiene inside it.

What Is It for?

This element is used as a cicatrizer, bactericide, fungicide, and for the treatment of respiratory infections in the form of syrup, popsicles, and spray.

Bee Venom

Apitoxin is the poison secreted by the workers who use it as a means of defence against predatory animals, insects, and people, and for combat between bees.

What Is It for?

It is used for therapeutic purposes to treat rheumatism and arthritis, and research is being carried out on its results in neurodegenerative diseases such as Parkinson‘s and Alzheimer‘s diseases.

Benefits of Apitherapy for Humans and Animals

The benefits of bee products used in apitherapy (honey, pollen, royal jelly, propolis, and venom) are multiple for the organism due to their nutritional, therapeutic, and cosmetic properties.

Since ancient times, honey has been considered a treasure of nourishment, healing, and beauty. In Egypt, it was considered "the nectar of the gods". The Greeks also found in this exquisite product an endless number of properties and athletes of ancient Greece used it to provide energy to their bodies. Honey was the origin of one of the first alcoholic drinks drunk by humans, mead, consumed by Greeks, Romans, Celts, Normans, Saxons, and Vikings; it was the preferred drink of Julius Caesar. In America, the Mayas produced a mead called balché, which was a sacred drink used in religious ceremonies. It was also used for its medical properties in traditional Chinese, Korean, Russian, Egyptian, and Roman medicine. Modern apitherapy refers to the use and consumption of bee products including bee venom.

We will see next the benefits of apitherapy in *humans and animals*.

Therapeutic and Preventive Benefits of Apitherapy

Honey

It is beneficial in wound healing because it has anti-inflammatory, antimicrobial, disinfectant, exudative, antioxidant, and analgesic effects,

because it accelerates healing and epithelialization, and because it improves blood circulation.

The antibacterial property of honey is attributed to some of its physical characteristics: high osmolarity, acidity, and hydrogen peroxide content. Its high sugar content produces an osmotic action that extracts water from microorganisms and dehydrates them. In addition, honey provides a humid environment in the wound, accelerating its healing in 50% of time. Acid pH inhibits bacterial growth.

In addition, it:

- Helps fight colds and sore throats;
- Promotes healing of some stomach diseases;
- Has a gentle laxative power;
- Acts as a relaxing substance;
- Helps fight the symptoms of exhaustion.

Propolis

- It has many medicinal properties: antibiotic (fungicide and bacterial), healing, anti-inflammatory, analgesic, anti-allergic, epithelial, and anaesthetic;
- It promotes healing, regenerates epithelial tissue and, thanks to the presence of arginine, it is effective in burns or cases of acne; It is protective of the liver;
- It helps inhibit viruses such as smallpox and influenza;
- It is rich in flavonoids, so it reduces upper respiratory microbes and is useful in the treatment of rhinopharyngitis

Bee Venom (Apitoxin)

The main advantage of its use is that it is an alternative to traditional medicine, less invasive and more natural, as no laboratory chemicals are used.

It contains multiple substances such as melittin, phospholipase or apamin that provide the following benefits:

- It improves muscular, circulatory or skin diseases;
- It has been shown to be an effective antidote to ageing;
- It is an anti-inflammatory, healing, and vasodilator;
- It is used in the prevention of muscle cramps;
- It is used in people with hypertension problems;
- It improves metabolism and elimination of toxins and oedemas;
- It favours the cardiovascular system, as apitoxin is anticoagulant and decreases heart rate;
- It favours the treatment of stress or anxiety;
- It can be combined with physiotherapy and other treatments to multiply its positive effects;
- It fights pain and is a local anaesthetic.

One of the most important advantages of apitherapy is the relief of chronic or punctual pain, since apitoxin is a very powerful analgesic. It is a therapy administered to patients with musculoskeletal and joint pain such as arthritis, rheumatism, sciatica, etc.

The extraction of the venom has already been achieved in laboratories, which is an advance for the apitherapy technique because it allows the venom to be inoculated through a syringe and does not cause the death of bees.

Other studies demonstrate Apitoxin‘s potential versus:

- some cancer cells: research conducted at the Faculty of Medicine of the National University of Colombia shows that it serves as a complementary treatment against cancer, but not definitive;
- multiple sclerosis, dementias and degenerative diseases of the nervous system: although there are no conclusive studies, honey may be a memory enhancer.

Apitherapy and Sport

Honey is one of the best muscle retrievers out there:

For long-distance runners (marathon, triathlon, and long distances), it is an indispensable food in the diet. As we said before, honey has a lot of high-quality sugars and no fat. The body quickly assimilates these natural sugars for energy, so it is ideal to be taken before, during, and after training.

- Before a race, it is important to have full glycogen deposits;
- During the race, the body consumes the glucose reserves, the sugar levels decrease and, if we do not have fast energy, we will not be able to face a sport activity of high intensity. It is essential to maintain adequate glucose levels to improve potency. During training, a solution of water and honey can be transported for drinking;
- Once the race is over, it helps in the muscular recovery by recharging the glycogen and mineral deposits. Eating a spoonful of honey after exercise is good for regaining muscle vitality and better face the next workouts.

It is now fashionable to take energy gels during training to maintain energy for a long time. They are easy to transport and affordable, but their composition is not as natural as that of honey and its derivatives.

Numerous studies show that additional glucose inputs improve performance. According to researcher Richard Kreider of the Sports Nutrition Laboratory at the University of Memphis, honey is a multi-sugar “cocktail” that has worked very well during training. In one study, 9 male competition cyclists did a 64 km training cycle every week for 3 weeks taking honey, dextrose gel, or a placebo with flavour and no calories. Participants received 15 g of that

supplement along with 250 ml of water before running and then every 16 km by bicycle. Both honey and dextrose gel led to better cycling times and more cycling power among the athletes, which led the researchers to conclude that honey can be a natural and effective source of carbohydrates for endurance athletes.

Bee venom or Apitoxin in athletes:

Bee venom helps in the recovery of sports injuries:

It is demonstrated that the stimulation that apitoxin produces in the pituitary gland could be the key in the capacity of our organism to regenerate cartilages to be taken into account in long distance runners. In these athletes, the most common injuries are those of the knee and foot. Specifically, in athletes, it has positive benefits for the treatment of tendinitis and bursitis.

Other benefits of bee products

Cosmetic Benefits of Honey and Apitoxin

Honey for face, body and scalp.

Since ancient times, honey has been used as a beauty product. Among its benefits are:

- It is a natural cosmetic;

- There is a wide range of face cold creams and gels with moisturizing and repairing properties, which provide vitamins and help maintain a more cared for and youthful face;
- The commercialization of these products is proliferating through the Internet, although they can also be found in parapharmacies;
- Honey masks, along with shampoos and hair conditioners, restore the hair to its original protective layer and give it a shinier, healthier look; Honey soap attracts moisture to the skin in order to keep it supple and soft; it includes essential oils from plants such as lavender to give it a pleasant aroma;
- These products can be homemade or made by the cosmetics industry.

Apitoxin is now fashionable as the main ingredient in masks, serums, restorative facial oils, and eye contours.
Among its benefits are:

- It combats the appearance of free radicals responsible for skin aging;
- It helps disguise wrinkles and fine lines and firm the facial oval.

Nutritional Benefits

Honey:

- Being a carbohydrate, it provides a lot of rapid energy;
- It is rich in phosphorus, potassium, vitamins A, B and C, minerals, amino acids, antioxidants, and folic acid; It contains no fat;

- It has no expiration date; having an acid pH bacteria and microorganisms cannot live in honey

Pollen:

- It is revitalizing, it is indicated in people who feel weak, tired, or who have gone through some disease;
- It contains all essential amino acids, making it a good source of protein for vegetarians;
- It contains high amounts of beta-carotene, vitamin C, potassium and calcium;
- It provides energy, but not as fast as honey.

Royal Jelly:

- Particularly rich in group B vitamins, it is of great help for the nervous system in people with depression, anxiety, and in time of studies;
- It is indicated during the growth of children because it is a natural multivitamin.

Propolis:

- It is effective against several species of pathogenic microorganisms and it has inhibitory effects on some viruses: it is antimicrobial, anti-fungal, and antiviral.

Culinary Benefits of Honey

Honey has great repercussions in the kitchen where it counts on multiple uses being a staple ingredient in many plates. Its physical properties, such as its viscosity, tone, and lustre make it an attractive ingredient. It is a rich and sweet product pleasant to the palate. Its sweetening power is greater and healthier than that of sugar; it is advisable to replace with honey the sugar we use, for example, in herbal teas.

Other advantages of using honey in the kitchen are:

- It softens the acidity of natural tomato sauce;
- It improves the texture of roasted meat;
- It clarifies wines and juices;
- It freezes the fruit;
- Due to its hygroscopic capacity, it maintains the humidity of sponge cakes and pastries;
- It reacts with yeast (sodium bicarbonate) helping to bake doughs in baking the antioxidants it contains; It helps delay the appearance of rancid flavours;
- Sugars help to speed up browning reactions, improving the taste and appearance of the rind of some dishes; It can be caramelized;
- You can make vinaigrettes for salads enhancing the flavours and making marriages with mustards.

Honey has played and continues to play an important role in the traditional pastry of many countries. For example, Baklavas are made in Turkey and Greece.

In Spain, the Pestiños, a typical Christmas cake, and the Torrijas, a typical Easter cake, are made.

Risks and Recommendations in the Use of Apitherapy

Risks in the use of apitherapy.

Apitoxin apitherapy is not suitable for everyone. Let us look at some cases:

- Pregnant women should wait until they give birth before undergoing this type of treatment to avoid complications in the foetus; Not shown to be effective in eradicating cancer;
- People who suffer from infectious or sexually transmitted diseases, heart diseases, or other chronic diseases, cannot be subjected to the pick of bee venom;
- Treatment with bee venom may cause adverse reactions:
    - frequent exposure to venom can cause arthropathy;
    - in sensitive individuals, the venom may act as an allergen causing allergic reactions ranging from mild

local inflammation to severe systemic reactions, anaphylactic shock, or even death. Anaphylactic episodes should be treated by the apitherapy professional with adrenaline and receive medical attention;

- Some people may express fear, indecision, or anxiety about needle punctures or bee stings.

With regard to honey, these recommendations must be taken into account:

- It is beneficial to introduce it in the daily diet, but it is necessary to consume it with caution because its caloric contribution is very high;
- Avoid consuming "industrial honey" because it is subjected to processes that destroy much of the enzymes and amino acids, and do not contain their original nutrients;
- People who have a sensitive digestive system should watch their consumption because it can cause irritation.

In reference to propolis, its possible adverse effects are:

- Excessive consumption can cause gastrointestinal disorders;
- It must be used for short periods, never continuously;
- In pregnant and lactating women, it has to be recommended by the doctor previously;
- Some people may be allergic. Start by taking a minimal initial amount and observing the reaction. It may aggravate allergic asthma symptoms.

Advice and recommendations on the use of apitherapy.

- It is necessary to consult the doctor or specialist in apitherapy before initiating the treatment so that he/she assesses if it is advisable or not; Apitherapy based on the administration of apitoxin should be applied by a professional, since it is the poison produced by the bee and, if not used correctly, can be very dangerous to health;
- It is essential to make sure that the patient is not allergic to bee venom, so you should perform an allergy test to confirm that the patient is fit for it;
- It may be advisable to visit the allergist beforehand. In many apitherapy centres, they have agreements with clinics that carry out the specific allergy test for bee venom by means of a blood test;
- The professional should instruct the patient to take other products made by bees (propolis, honey, royal jelly, etc.) to enhance subsequent treatment with apitoxin;
- More clinical studies on its use are still needed. Apitherapy as an adjunct to physiotherapy in the treatment of arthritis produces beneficial effects and functional improvement, but establishing its long-term effects requires more research and control (Vélez, Cabrera & Bohórquez, 2010).
- This is an expensive product since it is necessary to extract pure bee venom in laboratories to avoid the death of the bee when injecting its venom.

Benefits of Apitherapy for Animals

Just as honey is good for humans, it can also be very beneficial for animals. Dietary use and animal therapies are rapidly becoming popular among pet owners because of their benefits and healing effects. It has also grown in use in veterinary medicine given its successful benefits specifically in the treatment of wounds, burns, or cataracts.

Birds

Honey for aphonia problems and colds at the time of feather fall. It will be administered in the pasta of breeding, in bars of honey, or diluted with lukewarm water in the drinking trough.

Dogs

Adding honey to a dog's diet can help increase energy levels and activate older dogs. It will be administered by letting the dog lick a teaspoon, or mixed with water from the drinker or with its food; you can also spread it on a piece of bread.

Further:

- Help in environmental allergies: Honey has small amounts of pollen. It can relieve the symptoms of allergic dogs. It works by exposing the animal to a very low level of the allergenic substance. Over time, it may help you develop immunity to these substances. It is important that the honey is pure and local to ensure that the dog is exposed to the same types of pollen that cause the allergic reaction;
- Help with gastrointestinal problems: due to its anti-bacterial properties, in dogs suffering from gastritis, IBD, colitis and

other gastrointestinal problems as a result of excessive bacterial growth;

- Aids in digestion: contains amylase, an enzyme that facilitates the digestion of carbohydrates;
- Helps fight infections: relieves cough, expectorant against phlegm, etc.

There are shampoos with honey for dogs designed to gently clean and soothe dry itchy skin.

Cats

The same as with dogs: if the cat suffers a cold or has an external wound, we can apply in the area to heal it.

In the market, there are several products specifically intended for animals such as Vetramil, which is a healing for dogs and cats made with honey that is presented in ointment and spray.

Contraindications of Honey Consumption in Pets

- Sugar consumption can cause problems for dogs;
- Honey is sticky and sweet, so it can cause cavities if not cleaned;

  the oral hygiene of the animal must be maintained under conditions of oral hygiene;
- It can stick to the feathers of birds so it is important how they consume it;
- It has been shown that foods with sugar do not suit felines; their taste buds do not distinguish that taste, so it does not give them any special pleasure either. The amount of honey that can be given to a cat is very small, and always in very punctual moments.

Economic and Social Advantages of Apitherapy

In recent years, the consumption of honey has experienced a strong growth worldwide, mainly in Europe. Currently, there are producing regions that can barely meet the demand of markets. The production of honey and its derivatives are highly quoted products and highly competitive in the international market, with secure market. There are countries such as Germany and Japan that use them as raw materials in the production of drugs with high demand by the pharmaceutical industry. The economic and social benefits of apitherapy are manifold and interest in this natural therapy is growing day by day.

- Beekeeping has become one of the livestock sectors least affected by the economic crisis in countries such as Spain, which is generating interest among young people who see, in this activity, a profitable business and an opportunity for future employment;
- The need for training causes professional associations to organize multiple training courses in apitherapy;
- The products of beekeeping have been used in many societies.
- The consumption of honey and its derivatives and its culinary use create employment and benefits in the **local and regional economy** through the sale of products in small and medium businesses, in fairs and markets.
- The production of products derived from honey (candles, ointments, wines, food products, etc.) and their marketing can generate better incomes for the producer than the sale of raw material;

- Bee honey, wax, and its derivatives have great cultural value in many societies and can be used in rituals and celebrations, births, weddings, religious ceremonies and festivities;
- Beekeepers are respected for the work they do; bees and beekeepers have a good reputation because they generate goods in the communities in which they operate;
- Beekeeping provides important service for agriculture – e.g. crop pollination.



Conclusions on the Advantages of Apitherapy

The products of the beehives (honey, pollen, propolis, royal jelly, and venom) are a gift of nature that, since ancient times, have been used by man due to their health benefits. Currently, scientific studies support the use of Apitherapy to improve human and animal welfare. It is a natural therapy widely used in many countries of the world, even being integrated into their health systems. It is currently presented as a branch of alternative medicine that has great allies among the scientific community, although it requires more clinical trials. However, the potential of apitoxin seems undeniable and its prospects are very positive. Apitherapy, like any other therapy, must be applied by professionals who know how to obtain the best benefits for patients. In terms of lifestyle, it is healthy to introduce honey and its by-products as part of a balanced diet and with a responsible and moderate consumption, avoiding the use of industrial products, replacing them with organic honey and certified origin. The increase of its consumption

and the new uses in natural cosmetics make it a more socially valued product that brings economic and healthy benefits to society.

Community Legislation

For almost twenty years, the beekeeping sector has had a Community operational support programme, developed in all EU Member States through **National Programmes**. In Spain, for example, it is known as the National Beekeeping Plan (PNA). These plans adapt the objectives and foundations of the Common Agricultural Policy to the particularities of beekeeping production in each member state, so that it constitutes a fundamental market tool for technical assistance and modernisation of beekeeping activity. In addition, the member countries of the European Community (EC) must comply with **community legislation**, by virtue of the Treaty of the European Community, which, in Article 249, says, "In order to fulfil its mission, the European Parliament, the Council and the Commission shall adopt regulations and directives, take decisions and formulate recommendations or deliver opinions, under the conditions laid down in this Treaty." These regulations shall be of general application, binding in their entirety and directly applicable in all Member States:

- Council Regulation (EEC) No 2092/91 (24 June 1991) on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs;
- Commission Regulation (EC) No 797/2004 (26 April 2004) on measures to improve the conditions for the production and marketing of apiculture products;
- Council Regulation (EC) No 917/2007 on measures to improve the conditions for the production and marketing of apiculture products; Council Regulation (EC) No 889/2008 on organic production and labelling of organic products, with regard to organic production, labelling and control.

- Each member country develops its national legislation on the basis of the previous regulations; in some cases, there are regional laws, as in Andalusia, one of the 17 Spanish Autonomous Communities that has a wide legislative development. All these regulations help beekeepers become more professional. The EU is also firmly committed to the environment and healthy eating. Support for beekeeping has been increased through subsidies:
- Research projects and improvement of the quality of honey;
- Support for training;
- Incentives to create new farms and businesses;
- Pest control.

EU aid to the beekeeping sector is intended to improve the situation of beekeepers and help them market their products, with a desire to promote a sector that has become a pillar of agriculture and is contributing to the improvement of the environment. At present, it is estimated that 600,000 beekeepers live in Europe from honey, the number of hives is over 17 million, producing 250,000 tonnes of honey annually. The EU is the second largest producer of honey in the world after China. Turkey ranks third. In Europe, the largest producer of honey is Spain, with a production of more than 20 tonnes per year. It is followed by Hungary, Germany, and Romania. The latest aid has had an increase of 10% of economic contribution compared to previous plans. Interest in honey and its derivatives is growing among the population. Production has diversified and varieties have been incorporated which are attracting the attention of consumers.

The **association of beekeepers** is also an important factor for beekeeping activity: associations are increasingly numerous in honey

producing countries and aim to defend and promote the development of beekeeping. Being associated benefits the beekeeper in the following terms:

- Advice, loan of books and magazines, and training courses;
- Access to social facilities to attend talks, show their own production, and exchange experiences with other beekeepers; Information on subsidies, grants, legislation, participation in face-to-face, and on-line fora.
- The Spanish Association of Beekeepers (A.E.A.) was created in Spain in 2012, with the aim of promoting beekeeping in Spain.

Legislation in Spain:

- Royal Decree 209/2002 laying down rules for the management of beekeeping holdings Law 8/2003 on animal health
- Royal Decree 428/2003 on basic regulations for subsidies for the promotion of livestock health defense groups Royal Decree 1049/2003 approving the Quality Standard for honey
- Royal Decree 479/2004 establishing and regulating the General Registry of livestock farms
- Royal Decree 448/2005 regulating the system of aid to beekeeping in the framework of annual national programs
- Royal Decree 608/2006 establishing and regulating a National Program for the control and control of honey bees diseases Royal Decree 751/2006 on authorization and registration of carriers and means of transport of animals and by which the Spanish Committee for the welfare and protection of production animals is created
- Order APA / 735/2008 amending Annex II of Royal Decree 608/2006, establishing and regulating a National Program for the control and control of diseases of honey bees
- Order ARM / 2605/2011 defining the holdings, animals and insurable productions, the minimum technical conditions of exploitation and management

3. Products from the Hive: Introduction

In general, the apicultural sector provides many assets starting with a very important activity – pollination. This service ensures and sustains the biodiversity and stability of ecosystems including the agricultural sector via crop pollination services. Moreover, beekeepers can harvest several bee products from the hives such as honey, pollen, bee bread, propolis, royal jelly, bee venom, and beeswax. Those products can be easily harvested in high quality, sold on the market, or used in Apitherapy (Bradbear, 2009).

Bee products can be divided into two categories. The first category covers the so-called primary or direct bee products. These bee products are produced (synthesized) by the bees themselves. This category involves royal jelly, beeswax, and bee venom. Royal jelly is a nutrient-rich food for the bee brood (larvae) and queen so she can live longer and can lay thousands of eggs each day. Beeswax is used as building material in the hive by honeybees which build hexagonal honeycombs. The last primary product – bee venom – has a protective purpose and serves as a weapon for enemies (other bees, other insects, mammals, etc.).

The second category includes honey, bee pollen, bee bread, and propolis. These products are gathered from the environment and transformed by the bees in the hive, therefore are called secondary

(indirect) bee products. Honey provides an important source of energy for the bees allowing them to survive during winter periods by using it as a fuel for heating the hive. Bee pollen and bee bread provide essential nutrients in the bee's diet including proteins, vitamins, minerals, and other constituents important for the overall immune system of the bees.

Manuka honey

This type of honey has dark colour and is produced from *Leptospermum scoparium*, commonly known as manuka tree. It has special antibacterial properties due to methylglyoxal (MGO), which is up to 100 times higher than in other types of honey. It also has antiviral, anti-inflammatory and antioxidant effects. It is used to heal wounds, soothing sore throats, prevent tooth decay and prevent stomach ulcers.

Propolis is known as a bee glue and its primary use is as a material for sealing the nest cavity and, at the same time, as a protection tool for various external and internal pathogens due to its strong antimicrobial activity (Schmidt, 1997).

Less known products from hives (Demeter, 2017):

- Beehive air inhalation;
- Beehive biofield in apimodule.

The following chapters deal in detail with specific bee products:

- 4. Bee Venom and Its Features/Properties
- 5. Beeswax and Its Features/Properties
- 6. Bee Pollen and Its Features/Properties
- 7. Propolis and Its Features/Properties
- 8. Royal Jelly and Its Features/Properties

4. Bee Venom and Its Features/Properties

Bee Venom Characteristics

Among many species of insects, only a few have the ability to defend themselves with stings and venom injected at the time of the sting. All stinging insects belong to the Hymenoptera order, which includes ants, wasps, and bees. Because only females can sting, it is thought that the sting has evolved from an ovipositor, i.e., an organ that once used to lay female Hymenoptera insects. The sting is always at the end of the abdomen, not on the head, so the pain inflicted by the bee defending her family is not caused by the bite, as is often said, but by the sting. There are many other venomous insects that give off poisonous venom. Usually, they cover their body with it, spray it, form wounds and release venom into the wound, or inject it through the mouth-pipe or sting. In some cases, venom is used to protect a single individual or, in the case of social insects, to defend the family. Venom is also used to kill the victim (as in the case of some wasps or spiders) or to immobilize and stop it (for bees' own consumption or for growing offspring). Worker bee venom is produced by two glands connected to a sting. Its production increases during the first two weeks of an adult worker's life and it reaches its maximum when a worker defends her hive from robbery. It decreases with the age of the bee. The mother's venom production is the highest immediately after biting, probably because it must be prepared for immediate fight with other mothers. When a bee stings, it usually does

not release all the venom, i.e., 0.15 to 0.3 mg, stored in a venom sac. Only when an animal with skin as hard as ours stings it will lose its sting – and, with it, the entire stinging apparatus, that is the venom sack, muscles, and nerves. It is the nerves and muscles that pump the venom for a while after the sting or until the venom bag is empty. The loss of such a significant body part is almost always fatal to bees. The average lethal dose (LD50) for an adult is 2.8 mg venom per kg body weight, i.e., a person weighing 60 kg has a 50% chance of surviving stings with a total weight of 168 mg bee venom (Schumacher et al., 1989). Assuming that each bee injects all her venom, i.e., 0.3 mg, with one sting and does not lose its sting quickly, 600 stings would be fatal for such a person. For a 10 kg child, 90 stings would be deadly. That is why quick removal of the sting is so important. However, most human deaths have been caused by one or more stings due to an acute allergic reaction, the so-called anaphylactic shock, heart failure or suffocation due to swelling around the neck or mouth. However, in low doses, bee venom can be useful in treating many ailments. This healing effect was already known to many ancient civilizations. Today, bee venom is used in human and veterinary medicine and should be applied only under medical supervision.

Physical Properties of Bee Venom

Bee venom is a clear, odourless, watery liquid. After contact with mucous membranes or eyes, it causes intense burning and irritation. Dried venom acquires a light-yellow colour. Some preparations intended for sale are brown. It is believed that they brown due to the oxidation of certain proteins contained in the venom. The venom contains a number of volatile compounds that are lost during harvest.

Venom Composition

Many studies have been done on bee venom composition. A large part of the basic identification of compounds, their isolation, and the study of their pharmacological effects was carried out in the 1950s and 1960s. There are some comprehensive studies, such as Piek (1986), which discuss the morphology of the stinging apparatus, venom collection, bee venom pharmacological effects, and Hymenoptera venom allergy, i.e., bees, wasps and ants. Eighty-eight percent of the venom is water. The content of glucose, fructose and phospholipids is similar to the content in bees' blood (Crane, 1990). At least 18 pharmacologically active ingredients have been described, including various enzymes, peptides, and amines. Table 4 lists the main components of the venom according to Dotimas & Hider (1987) and Shipolini (1984). The chemical composition and various actions of individual components are not discussed here. Schmidt (1992) provides complete data on bee and other Hymenoptera venom allergies. Crane (1990), Dotimas & Hider (1987), and Banks & Shipolini (1986) comprehensively discuss the composition, action, collection and use of the bee venom. The venom of different species of *Apis* is similar, but it differs slightly depending on the breed. *Apis cerana* bee venom is twice as toxic as *A. mellifera* bee venom (Benton & Morse, 1968).

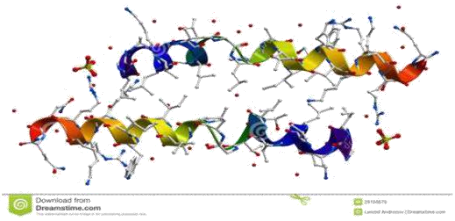


Figure: Melitin, the main component of bee venom[2]

[2] http://www.dreamstime.com/royalty-free-stock-images-melittin-principal-component-bee-venom-image29150679

Table. Composition of venom from honeybee worker

Class of molecules	Component	% of dry venom[a]	% of dry venom[b]
Enzymes	*Phospholipase*	*10-12*	*10-12*
	Hyaluronidase	*1-3*	*1.5-2.0*
	Acid Phosphomonoesterase		*1.0*
	Lysophospholipase		*1.0*
	a -glucosidase		*0.6*
Other proteins and Peptides	Melittin	50	40-50
	Pamine	1-3	3
	Mast Cell Degranulating	1-2	2
	Peptide (MCD)	0.5-2.0	0.5
	Secapin	1-2	1.4
	Procamine		1.0
	Adolapin	0.1	0.8
	Protease inhibitor	13-15	0.1
	Tertiapin		
	Small peptides (with less than 5 amino acids)		
Physiologically active amines	Histamine	0.5-2.0	0.5-1.6
	Dopamine	0.2-1.0	0.13-1.0
	Noradrenaline	0.1-0.5	0.1-0.7
Amino Acids	t -aminobutyric acid	0.5	0.4
	a -amino acids	1	
Sugars	Glucose & fructose	2	
Phospholipids		5	
Volatile compounds		4-8	

Physiological Effects of Bee Venom

Tradition of the Bee Venom

Bee venom has long been used in traditional medicine to treat various types of rheumatism. Although the venoms of different bee species differ slightly from each other, there have been reports of effective treatment of rheumatism using *Apis dorsata* venom in Sharma & Singh (1983) and *A. cerana* venom in Krell (1992, unpublished). The list of benefits brought to people and animals is very long. Most reports of cured diseases relate to individual cases, although several unrelated patients have experienced improvement or have been cured of similar ailments. Bee venom treatment is often accompanied by a change in lifestyle, nutrition or other changes that can be due to partial, if not major, improvement. Reported clinical trials have often been conducted in countries with less stringent testing methods compared to standard Western double-blind studies. Despite these concerns, many patients reported positive results and were successfully cured after established medical or surgical procedures. Western medical circles, however, do not accept these results or oppose research on bee venom according to Western medical standards. Diseases and problems reported by patients or doctors that have improved or cured by using bee venom are listed in the table below (Table 5). However, this is not an approval or recommendation for this type of therapy. Bee venom should never be used unless you have access to emergency treatment options for an allergic reaction.

Therapeutic Effects

Over 34 million people in the world live with the human immunodeficiency virus (HIV). Recent research at the Washington University School of Medicine in St. Louis has shown that bee venom

and its main active ingredient, melittin, transmitted by nanoparticles, is able to destroy diseased cells and cancers caused by viruses such as HIV. Melittin is a strong bee venom toxin that is able to break through the protective sheath surrounding HIV, as well as many other viruses. It is surprising that this toxin fortunately does not harm healthy cells, only those infected by the virus.

A recent study by scientists from Western Australia, published in 2020 in the international medical journal Nature Precision Oncology, shows that bee venom can kill difficult-to-treat aggressive breast cancer cells while having minimal effects on healthy- noncancerous cells in the body. Researchers at the Harry Perkins Medical Research Institute in Perth, Australia, tested the anti-cancer effects of 312 bee and bumblebee venom. Bumblebee venom, despite its high concentration, failed to kill cancer cells, but bee venom has shown a remarkable effect. An important component of the poison - the toxin melitin - killed aggressive cells in large numbers, especially in the triple negative form of breast cancer, without damaging healthy cells. It can also be toxic to tumors causing lung, ovarian or pancreatic cancer.

Further research will be required to assess whether the venom of some genotypes of bees has more potent or specific anticancer activities, which could then be exploited.

Table: List of diseases and health problems improved or healed according to anecdotal reports

Humans		
Arthritis, many types	Multiple sclerosis	Premenstrual syndrome
Epilepsy	Bursitis	Ligament injuries
Mastis	Some types of cancer	Sore throat
Chronic pain	Migraine	General immuno-stimulant

Decreases blood viscosity and coagulability	Dilates capillaries and arteries	Decreases blood cholesterol level
Neruoses	Rhinosinusitis	Endoarteriosis
Therosclerosis	Polyneuritis	Radicultitis
Infectious spondylitis	Neuralgia	Endoarthritis
Infect. Polyarthritis	Malaria	Intercostal myalgia
Myositis	Tropical ulcers	Slowly healing wounds
Thrombophiletritis	Cancer, temporary	Keratoconjunctivitis
Iritis	Iridocytis	Asthma

Side Effects of Bee Venom

Application of the bee venom can cause: anaphylactic shock, Guillain-Barre Syndrome, an irreversible ulnar nerve injury, thrombocytopenia with ecchymoses, an “acute lung injury”, arrhythmia, stroke, nephrotic syndrome, pulmonary oedema, liver failure, hepatitis, uterine contractions or dermatologic complications. Bee venom is safe for human treatments; the median lethal dose (LD50) for an adult human is 2.8 mg/kg of body weight. As an example, a person weighing 60 kg has a 50% chance of surviving after injections 168 mg of bee venom. Five hundred and sixty stings could be lethal for such a person – assuming that 0.3 mg of venom is injected per sting. For a child weighing 10 kg, only 90 stings could be deadly. It is necessary, before bee venom use for

therapeutic purposes, to take all measures, including allergy testing to protect the patient and use correct dosage.

The median lethal dose (LD50) of bee venom for an adult human is 2.8 mg /kg of body weight.

Contemporary Use of Pure Bee Venom

Legal Forms of Venom

The only legally accepted medical use of bee venom in Western Europe and North America is desensitization of hypersensitive (allergic) people to bee venom. Since the early 1980s, it has been used to desensitize pure bee venom. The use of bee extracts was largely discontinued after double-blind studies that confirmed the higher efficacy of pure venom (Hunt et al., 1978). In some Eastern Europe countries and in many Asian countries, bee venom has long been used in official medicine for various ailments.

Venom Application

Pure venom injections and well-located bee stings are becoming more and more popular in Western countries as an alternative to potent (and, sometimes, ineffective) drugs whose use is associated with many side effects. This is especially the case with rheumatoid arthritis and other inflammation. Bee venom application methods include natural stings, subcutaneous injections, electrophoresis, ointments, inhalations, and tablets (Sharma & Singh, 1983). Because bee venom has both local and systemic effects, the correct location for injections or stings and the dose are very important. Therefore, bee venom therapy should be learned properly. Still, relief for some ailments can be brought simply by one or two stings in the right place, i.e., a painful, immobile joint attacked by arthritis.

Acupuncture

In 1980, the Bee Acupuncture Association was founded in Japan. In the following years, there were many reports on the experiences and successes in api-acupuncture (in Japan) in Honeybee Science (e.g. Ohta, 1983; Sagawa, 1983). In the People's Republic of China, many doctors and many hospitals combine apitoxin therapy with knowledge about acupuncture. In the West, the American Association of Apitherapy (AAS) collects information and case reports of bee venom therapy and the medical uses of other bee products. There may also be other national organizations, especially in Eastern Europe and Asia. IBRA and Apimondia also have a rich collection of reference materials.

Bee Venom Products

Bee venom can be sold in the form of bee extract, pure liquid venom, or injectable solution, but the market is very limited for all forms. Most venom is sold in dry crystalline form. Because the venom does not need to be processed, it can be prepared wherever there is a need for bee venom therapy. Production of small quantities is simple as long as aseptic working conditions and strict sanitary controls are ensured. The beekeeper must work in very clean conditions, because most preparations containing venom will later be used to inject people and animals.

Right before injection, you can mix the venom with a liquid such as distilled (sterile) water, saline solutions and some oils, or you can use it directly from prepared ampoules. Ampoules with a fixed dose ready for injection should only be prepared by certified pharmaceutical laboratories due to the need for strict aseptic conditions and very accurate dose measurement.

Creams are available that contain bee venom (e.g. Forapin and Apicosan in Germany, Apivene in France, and Immenin in Austria) that are used for external use for arthritic conditions (BeeWell, 1993; Sharma &

Singh 1983), but neither the ingredients, nor their proportions are known to the author.

The tablets may be saturated with bee venom, but Sharma & Singh (1983) recommend the removal of toxic proteins such as melittin and the use of colours to indicate different doses. The tablets should be placed under the tongue, but the action and usefulness of such a preparation are unknown.

5. Beeswax and Its Features/Properties

What is a Beeswax

Beeswax is the creamy coloured substance used by the bees to build the comb that forms the structure of their nest. Beeswax is produced by the young worker honeybees of all species of honeybees. Wax production and comb construction in a honey bee colony are determined by:

- A queen‘s presence (only colonies with a queen build combs);
- Brood rearing (egg laying) (the more eggs are laid, the more comb cells are needed);
- Nectar flow (the greater the flow, the more combs are needed for honey storage);
- Pollen presence (it is a source of protein);
- Temperature (comb building activity is favoured by temperatures above 15oC).

The study of the physical and chemical properties of beeswax started about 80 years ago with Bisson, Vanbell & Dye’s investigations. It continued with Tulloch’s comprehensive study on beeswax and other waxes secreted by insects.

Features of Beeswax

Beeswax has the following features:

- Colour (determined by the presence of alkanes) – from yellow to yellow-brown (when pure, it is white, but pollen and other substances make it yellow):
- Yellow beeswax is the crude product obtained from the honeycomb;
- White beeswax is yellow beeswax bleached or filtered;
- Beeswax absolute is yellow beeswax treated with alcohol;
- Consistency: non-sticking upon cutting;
- Non-sticking to the knife, to the teeth;
- Odour: pleasant and honey-like when heated;
- Plasticity: plastic after a 10-minute kneading;
- Spiral-like splinters when scratching it with nail or knife;
- Structure: fine-granular, blunt, not crystalline upon breaking.

Beeswax is a very stable substance, and its properties change little over time. It is resistant to hydrolysis and natural oxidization and is insoluble in water.

It is solid at room temperature, becomes brittle once the temperature drops below 18°C and quickly becomes soft and pliable at around 35 to 40°C, with a melting point of 64.5°C.

It is a complex material. It contains:

- Over 300 different substances;
- About 50 aroma components.

Production of Beeswax

The waxes produced by different species of *Apis mellifica* contain the same components but in a different proportion, while the waxes of other

species of bees (*Apis florea* and *Apis cerana*) also differ qualitatively from that of the *Apis mellifica* wax.

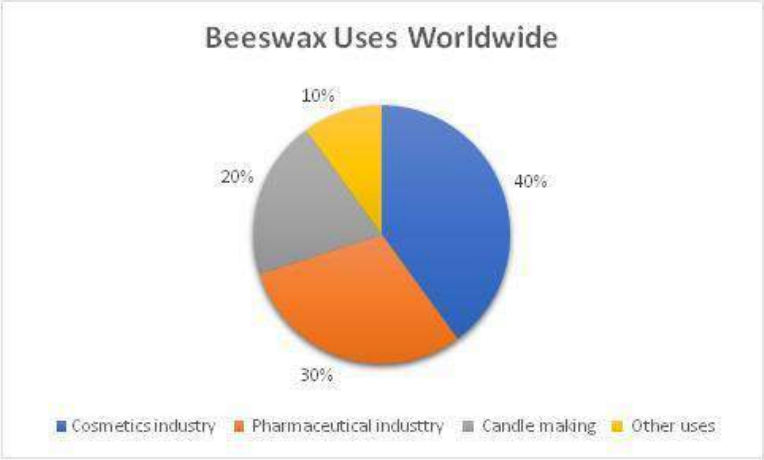
To produce high-quality beeswax in higher volumes, apiculturists should bear in mind the following:

- Adding 2 g citric/oxalic acid or 1 ml concentrated sulphuric acid per kg wax and 1 l of water brightens wax;
- Adding hydrogen peroxide bleaches wax (however, excess peroxide can cause problems in the manufacture of creams and ointments); Avoiding all movement of the container during cooling;
- Boiling wax in water does not kill heat-resistant spores of *Paenibacillus larvae* (only heating at 1400 hPa at 120oC for 30 min kills all spores);
- Feeding the bees energetic feedings (inverted sugar, juice of sugar-cane, and sugar syrup) (Carrillo et al., 2015); Heating at too high temperatures and for too long may damage the wax and darken its colour;
- Heating in aluminium, copper, steel, or zinc containers may darken the colour of the wax (stainless steel is more suitable); Heating in lead containers contaminates the wax;
- Leaving wax in a high-grade steel tank at 75-80oC overnight makes it purer; Letting the wax cool down as slowly as possible;
- Using 2-3 g of oxalic acid per kg wax and 1 l of water to bind calcium prevents emulsion and brightens wax; Using combs containing fermented honey gives the wax an “off” odour;
- Using hard water may produce water-wax emulsions (soft water with a low mineral content is more suitable): it is most important to keep raw molten wax in contact with water below 90oC;
- Using solvents to purify wax will result in aroma components loss.

Uses of Beeswax

Specialists claim there are hundreds uses of beeswax. Below are only the most important and common of them. These beeswax uses will help beekeepers to better market their beeswax.

Around 40% of the world trade in beeswax is used for the cosmetics industry (first class beeswax that has not been overheated is pure and is free from propolis), around 30% of world trade in beeswax is used by the pharmaceutical industry (good quality wax), around 20% of the world trade in beeswax is used for candle making, and the remaining 10% has other uses:



Purified and bleached beeswax is used in the production of food, cosmetics, and pharmaceuticals.

Production of Food

- Coating for cheese (to protect against mold growth) after letting it dry before applying the hot wax (wax will not adhere to wet surfaces)
- Colloidal stabilizer (e.g., in pesto);
- Food additive (E901);
- Glazing agent (to prevent water loss, to protect fruits);
- Ingredient of ginger bread

- Ingredient of natural chewing gum;

Production of Cosmetics

- Hairstyling (including starting and maintaining dreadlocks, treating dry hair, waxing man's beard/mustache) by combining and heating equal parts beeswax and coconut oil, allowing to cool and set, and then using small portions at a time, working it into the hair, and combing to style;

- anufacturing cosmetics: blush, eye liner, eye shadow, hand creams, lip balm, lip gloss, moisturisers, pomades, and salves; Waxing (blended with pine resin);

Production of Pharmaceuticals

- Compresses;
- Creams and ointments used to help pull plugs, to soothe joint pains and to treat anal fissures, atopic dermatitis, bruises, burns, cuts, diaper dermatitis, fractures, haemorrhoids, heel cracking, psoriasis, purulent tonsillitis, wounds;
- Drugs for the cure of abdominal disorders, arthritis, blood, burns, diarrhea, dysentery, eye sight, impotence, infertility in women, nasal inflammations, puss, sore throat, ulcer;
- Extracts with effective activity against bacteria (*Listeria monocytogenes*, *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Staphylococcus enterica*, *Streptococcus epidermidis*, *Streptococcus pyogenes*), fungi (*Candida albicans*, *Candida glabrata*, *Candida krusei*, *Candida parapsilosis*, *Candida tropicalis*, *Geotrichum candidum*), moulds (*Aspergillus flavus*, *Aspergillus fumigatus*, *Aspergillus niger*) and yeasts (*Rhodotorula mucilaginosa*);
- Plaster;
- Soft gelatin capsules, in pill/tablet coatings (E901);
- Surgical bone wax (to control bleeding from bone surfaces);
- Tooth models.

Other Uses of Beeswax

Art and Crafts

- Attaching reed plates to the structure inside a squeezebox (accordion, bandoneon, concertina, flutina, harmonium)

- Batiking using the ideal mixture for batik preparation: 30% beeswax + 70% paraffin

- Decorating Easter eggs using a wax-resist (batik) method
- Encaustic painting (hot wax painting) using heated beeswax as a binder for coloured pigments;
- Gluing handles onto cutlery knives (cutler's resin made of pine pitch, beeswax, sawdust or carnauba wax)

- Making Easter beaded eggs by fixing the beads in the beeswax coating the egg
- Making beeswax crayons to add more details to pictures, using equal amounts of beeswax and white bar soap
- Making luminaries
- Making candles that burn brighter, give off a sweet, warming honey aroma, and remove toxins from the air

- Making models and casting in art and industry (also called lost wax casting or cire perdue)
- Making modelling clay from beeswax and plant dyes to support a non-toxic hobby; Making sounds even on a tambourine drum head
- Modelling wax sculptures (e.g., Madame Tussauds Museum in London)
- Oil painting using beeswax as a stabilizer to add body

Household

- Conditioning wooden utensils (e.g., boards, bowls, spatulas, spoons) with a board/spoon butter out of mineral oil and natural beeswax by smoothing it into the utensils, letting them sit for a couple of hours, and rubbing down with a clean cloth;
- Controlling corrosion (oxidation caused by moist air) in bronze items with a solution of 151 g beeswax melted in 806 g turpentine by buffing it with a towel to create a thin, hard coat, or by rubbing it with softened beeswax and polishing off the excess with a lint-free rag; Greasing cookie sheets by warming them a bit first, rubbing wax over pans and using it in place of butter/oil;
- Making reusable food wraps from beeswax coated cotton material;

- Polishing furniture with a polish made of beeswax and coconut oil: melt 1 tablespoon of grated beeswax, stir in 3 tablespoons of coconut oil until melted, let cool and harden, use a clean cloth to rub it onto the wood furniture, and use another cloth to buff the furniture until all residue is removed;
- Polishing granite counter-top with warm beeswax to keep it shiny and to prevent it from staining by rubbing warmed beeswax in, allowing it to dry, and then wiping down to remove any excess;
- Polishing shoes;
- Preventing rust by rubbing cast iron pieces, hand tools, rakes and shovels with beeswax;
- Protecting wooden parts of tools (e.g., handles of shovels) to protect them against wear and tear by rubbing them with beeswax; Restoring leather boots, pocketbooks and shoes with a basic shoe polish formula: combine and heat 28.3595 g of oil and 14.1797 g beeswax until the latter is melted; remove from heat and stir in 2.38-4.76 g pigment adding more for darker colours; store in a small jar;
- Waterproofing boots and shoes by rubbing the beeswax over the entire boot/shoe, using a blow dryer to melt the wax all over the boot/shoe, and then letting the boot/shoe set for about 5 minutes before wearing;

- Waxing drawers, very old furniture joints, glass doors and windows that tend to stick to restore smooth movement;
- Waxing nails & screws to void splintering the wood while hammering them in;
- Waxing boot and shoe laces to hold better and longer.

Miscellaneous

- Keeping winter salt out of cats' and dogs' paws;
- Making camp fire starters from beeswax, drier lint and old egg cartons;
- Making electronics used as insulation in electronic components in the computer industry and in the manufacture of CDs;
- Making envelope seals to be applied on envelopes containing invitations to baby showers or weddings;
- Making grafting waxes;
- Making lubricants for industrial use;
- Making pastry (e.g., French canelés, crisp pastry with a custard center and a caramelized crust) by coating the pastry with beeswax and butter frozen to the molds before baking, thus helping creating a protective outer skin;
- Making sealants to graft on branches, to repair broken calabashes, to seal bottles and containers, etc.;
- Making soap;
- Polishing cars;
- Sealing academic parchments, formal legal decrees, formal royal decrees;
- Waxing surfboards;
- Waxing thread to lubricate and use it in handmade crafts such as hand-sewn leather goods and making jewelry;

- Coating hockey stick tape to give it better puck control and better water proofing.

Risks of Using Beeswax

There are a few risks using beeswax:

- Bacillus larvae spores in beeswax can cause infections;
- Penicillin-oil-beeswax can cause embolism;
- Polen or propolis traces in beeswax can cause allergies;
- Poplar resin in beeswax causes occupational dermatitis in beekeepers;
- Residual veterinary substances (e.g., insecticide flumethrin used in the treatment of parasitic mites in honeybee colonies) may damage human health.

6. Bee pollen and Its Features/Properties

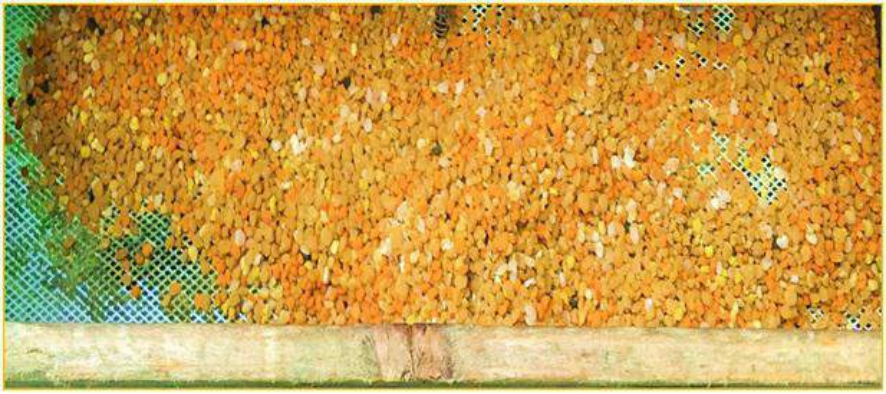
Bee pollen is often regarded as "the world's best food product" (Bobis et al., 2010). Global production of bee pollen is around 1500 tons per year. The largest producers are China, Australia, and Argentina (Estevinho, Afonso & Feás, 2011).

Plants evolved pollen as a reproductive means more than 375 million years ago. It is a fine powdery substance, typically yellow. Pollen is a mass of microspores in a seed plant appearing usually as a fine dust. Each pollen grain is a minute body of varying shape and structure, formed in the male structures of seed-bearing plants and transported by various means (wind, water, insects, etc.) to the female structures, where fertilization occurs. Pollen grains are, in essence, plant sperm. Inside, they contain the male portion of DNA needed for plant reproduction. There is great variation when it comes to the size of pollen grains, and there is no correlation between the size of the plant and the size of the pollen it produces. Large plants might generate some of the tiniest grains of pollen.

Pollen grains may not look like much. To the naked eye, they often look like dusty specks, but upon closer inspection, they take an endless array of fascinating shapes with all types of textures and features.

Basic Characteristics of Bee Pollen

Bee pollen is a valuable apitherapeutic product greatly appreciated by the natural medicine because of its potential **medical and nutritional applications**.



Medical Applications

Bee pollen is considered to act as:

- Antifungal;
- Antimicrobial;
- Antiviral;
- Anti-inflammatory;
- Hepatoprotective (prevents damage to the liver);
- Anticancer;
- Immunostimulating;
- Local analgesic.

Bee pollen is a plant product, rich in biologically active substances. About 200 substances have been found in pollen grains from different plant species. In the group of basic chemical substances there are proteins, amino acids, carbohydrates, lipids and fatty acids, phenolic compounds, enzymes and coenzymes, as well as vitamins and bio-

elements. Bee pollen contains 22,7% of protein on average, including 10,4% of essential amino acids. These protein elements are life essential and the organism cannot synthesize them by itself. Vitamins and bio-elements also belong to the valuable substances pollen contains. It is quite a significant source of vitamins, both fat-soluble (0,1%, such as provitamin A and vitamins E and D), and water-soluble (0,6%, such as B1, B2, B6, and C), and acids.

As a result of its composition, bee pollen is:

- Anti-atherosclerotic (due to its complex composition, reduces blood pressure when raised, improves blood circulation by improving liver function and promotes cell regeneration of arterial endothelium);
- Antibacterial (contains antibacterial substances such as bioflavonoids);
- Antidepressant (contains all the amino acids needed for the nervous system, encourages the body to produce endorphins thus acting as a natural antidepressant);
- Antitoxic (as it is the best food for the liver and a healthy liver can neutralize toxins better).

In addition to the above, bee pollen is a great brain booster, lifting brain fatigue, improving alertness and helping concentration levels over an extended period of time. Rich in the B vitamins; B1, B2 and B3 – these are essential for a healthy nervous system and powerful detoxifiers, especially to the brain. They are often referred to as “anti-stress” vitamins, which lessen anxiety and stress.

Nutritional Applications

The honeybee collects pollen and mixes it with its own digestive enzymes. One pollen granule contains from 100,000 to 5,000,000 pollen spores each capable of reproducing its entire species. Bee pollen is often referred to as nature's most complete food. There are no foods sources of bee pollen besides the pollen itself.

Bee pollen is considered a valuable dietary supplement. Animal feeding experiments with pollen have been carried out and it was proven that mice and rats fed with pollen showed a higher vitamin C and magnesium content in thymus, heart muscle, and skeletal muscles as well as a higher haemoglobin content and greater number of red blood cells when compared to animals given standard food. Moreover, bee pollen also lengthened the life span of experimental animals. In starved animals and those being on a nonvitamin diet, pollen caused faster weight gains than a normal diet. The researches prove that pollen has a high nutritional value as well as a property of fast supplementing the nutritional deficiencies. The components playing the vital role in the process are dispensable amino acids, vitamins, and bio elements.

Nutritional properties of bee pollen and the regulating metabolic processes are used, among others, in the cases of children's lack of appetite, developmental delay, and malnutrition of children and adults. Moreover, it is recommended to administer pollen in the recovery period after surgeries and to people working hard physically and mentally.

Bee pollen is dietetic – it is a very well-balanced vegetarian source of nutrients. Therefore, it is recommended for obesity, hypertension, gout, etc.

Furthermore, the adaptogenic properties of bee pollen, which are based on increasing the resistance to harmful physical, chemical, and biological factors, were also indicated: it is both increasing the physical fitness of the organism in excessive physical burden, affecting the central nervous system by improving brain functions, such as memory, learning, comprehending, thinking, and ability to concentration, and increasing the immune system strengths against infections.

It is considered that bee pollen is anabolic as it contains many vitamins and other nutrients that are involved in increasing appetite, and it helps build new cells. The German natural scientist Francis Huber claims that bee pollen is "the greatest bodybuilder on earth". As such, it is used by Olympic athletes and bodybuilders to increase strength and endurance. Its reputation as a muscle builder is due, in part, to its 22 amino acids. Around half of these are free-form, meaning they can be assimilated directly into the body ready for instant utilisation.

Bee pollen helps in combating nutritional deficiencies and regulates the activity of the liver, kidney, stomach, intestine, and the nervous system. Bee pollen is believed to fight against intellectual and physical fatigue, nervousness, insomnia and, as mentioned above, it has antiviral and antibacterial effects.

How Pollen is Harvested and Stored

Bee pollen is the golden-yellow powder that bees collect from flowers and store in pollen baskets on their hind legs.

Every species of bees collects pollen in their own way. One kind may store it and carry it on the hairs on their abdomen, other kinds may carry it to their hives on their hind legs, and others may collect pollen on their hairy bodies. These ways of collecting pollen, help the pollination process, as they are carrying it while flying and stopping on different plants. Some bees can carry up to 80% of their weight. It depends on the particular bee-species.

Special devices, pollen traps, are used to collect pollen baskets. The general rule of their functioning is to take some part of the pollen basket from field bees returning to the hive. Therefore, there are different dividers on the returning route of bees. The bees have to force their way through and, consequently, lose the part of the pollen basket which falls into special containers. These traps vary greatly in size, appearance, and method of installation on the hive. Each has some feature that makes it particularly adaptable for a specific purpose. All traps, however, have two basic elements:

1. A grid through which pollen-carrying bees must crawl to separate the pollen pellets from the bees' legs;
2. A container to store these pellets.

Pollen traps help harvest the pollen granules from a hive for human consumption. The loss of pollen mobilizes the bees. The amount of pollen collected from one colony during one day amounts to 50–250 g. According to data one bee colony gives 1 to 7 kg of pollen a year. As a result, bee pollen is marketed as a superfood and is sold at various health stores. When harvesting pollen from bees for human consumption, people need to make sure that there is enough pollen for the colony.

Bee Pollen and Bee Bread

Bee bread refers to the pollen stored by the bees in their honeycombs. It has a different composition than bee pollen. The bees place the pollen into cells, add various enzymes (from their saliva) and honey, and subsequently this mixture undergoes a process of lactic fermentation. This makes it more digestible and enriched with new nutrients.

Bee bread is collected by scratching it from the combs with a special fork and then attenuated with warm honey in the ratio of 1 : 5. After leaving the mixture for several days, bee bread falls down on the bottom of the container as it is heavy and separates itself from honey. After putting it into jars, the product is closed tightly and stored in a cool and dark place. Bee bread is considered highly superior to bee pollen by some, although from all the products of the hive, bee bread is the less explored bee product.

Bee pollen composition has been studied for decades and scientists have reached relevant conclusions, including big differences among each pollen type. The differences are also given by the way bee pollen is stored and processed. As mentioned in the previous sections, there are more than 200 substances present in bee pollen.

The bee pollen harvested from the traps is what we call fresh pollen and beekeepers have to collect it every day, because of its high humidity: almost 20 to 30 grams of water per 100 grams of pollen. This humidity makes an ideal culture medium for micro-organisms like bacteria and yeast, which is why beekeepers have to collect it daily and immediately place it into the freezer. This fresh bee pollen is the one with the most

nutritional and therapeutic value and when talking about bee pollen composition we are referring to this type of bee pollen.

Freezing followed by storage at -20ºC in pure nitrogen guarantees high biological qualities of bee pollen. Bee pollen stored for more than 6 months should, however, be dried by lyophilisation and stored at -20ºC in pure nitrogen to preserve its highest biological activities.

As already stated, the quality of bee pollen is at its highest level if it is fresh. The only way to preserve bee pollen is by immediately freezing after the daily harvest. The freezing can be done in glass jars or recommended plastic recipients, or in vacuum (a much better way). It should be kept in the freezer. It can be however kept at room temperature for several hours and then refrozen, without any significant damage.

Dried bee pollen, no matter the method of drying shall be kept at room temperature. The quality of dried pollen is below that of fresh pollen. Besides, after a year of keeping it at room temperature, while there was no loss of vit C, there were considerable losses of Vit E and beta-carotenes by 15 to 20 %. (According to the Brazilian study “Stability of antioxidant vitamins in bee pollen samples” conducted by DE MELO PEREIRA et al. in 2010.) Other studies showed that there are loses of considerable amount of its antioxidant activity (about 59%) after one year. (M. Campos, 2003).

Application of Bee Pollen

The history of bee products dates to ancient times. The Greeks believed that honey and bee pollen were the food of kings, giving them youth and life. Bee pollen is mentioned in the Holy Scriptures, including the Bible. Hippocrates and Pythagoras believed that pollen had a therapeutic effect. Bee pollen began to be used on a larger scale for human consumption only after World War II, when the method of pollen traps was improved.

Recently, there has been an increasing demand for natural products, particularly bee products. Bee bread and bee pollen, due to their nutritional and medicinal properties, are used for apitherapeutic purposes. These include about 200 different substances, such as free amino acids and vitamins. The nutritional value of bee pollen is often evaluated by the protein concentration, as well as the presence and quantity of essential amino acids (Roulston & Cane, 2000). Pollen is the only source of protein that bees collect from the nature. This is very important for the development of the offspring, and thus for the development of bee colonies as well (Anđelković et al., 2012). Pollen is certainly very important in the nutrition of honeybees, and some researchers make great claims for the nutritional value of bee pollen as one of the most complete foods in nature. It certainly has all the right ingredients, containing around 30% protein and including all the amino acids essential for human diets, a full spectrum of vitamins and minerals, trace elements, hormone precursors, carbohydrates, and fatty acids. It is possible that bee pollen provides valuable trace elements to supplement deficient diets. Apitherapy practitioners say that bee pollen gives energy, fights exhaustion and depression, and ensures resistance against colds and flu. For use in apitherapy, practitioners prefer to have bee pollen that is as fresh as possible: pollen that has been dried and stored for some time is thought to have a lower therapeutic value.

Bee pollen is a popular folk remedy for many conditions. Some examples are listed below, which show popular application of pollen for health promotion and apitherapeutic treatment:

- Prevention of prostate disease and improvement of male ability;
- Treatment of premenstrual syndrome (PMS) – a study found that a product containing bee pollen (and several other ingredients) seemed to reduce PMS symptoms;
- Treatment of enlarged prostate – some studies looked at an extract of bee pollen and found some benefits in men suffering from chronic prostatitis or enlarged prostate;
- For skin care in skin softening products;

- For treating eczema, pimples, and diaper rash;
- As an energy tonic.

There are proofs that bee pollen ointment may be effectively used in burn wound treatment since bee pollen prevents infection of the newly-formed tissue in the healing process of burn wounds.

A small study found evidence that bee pollen might reduce some side effects of radiation therapy for cancer.

Additionally, bee pollen is used against alcoholism, asthma, allergies, health maintenance, or stomach problems, but there is not enough proof that it helps with these conditions.

However, more research needs to be done before it is known to what extent bee pollen helps those conditions.

Dosing Considerations for Bee Pollen

Since bee pollen is an unproven treatment, there is no standard dose. One should ask their doctor for advice.

The appropriate dose of bee pollen depends on several factors such as the user's age, health, and several other conditions. At this time there is not enough scientific information to determine an appropriate range of doses for bee pollen. It should be kept in mind that natural products are not always necessarily safe and dosages can be important. Relevant directions on product labels should be followed and/or pharmacists and physicians or other healthcare professional consulted before using.

If one is taking bee pollen for the first time, it’s better to start with only few grains and increase them the following day with some more and so on till the recommended dose is reached.

Prophylactic and health enhancing (only examples)

- Adults: 10-20 g per day for 3 months, twice per year;
- Children: half the adult dose

Therapeutic (only examples)

- Adults: 20-50 g daily, taken 3 times per day, 1-2 hours before meals;
- Children: half the adult dose

Approximate weight of bee pollen given as spoons:

- teaspoon = 6 g;
- dessertspoon = 9 g;
- soupspoon/table spoon = 12 g.

Very important:

For improving pollen digestibility, it should be placed overnight in water or other liquid. Good chewing or milling of pollen before administering improves digestibility, too.

In order to counterbalance the bitter taste of bee pollen, 1 part of pollen can be mixed with 1 part of honey (by weight) or can be just mixed with other food.

Side Effects and Contraindications

Side effects

Generally, bee pollen seems fairly safe. However, it could cause potentially serious allergic reactions in people with allergies to honey, pollen (like ragweed or other plants, depending on where the bee pollen comes from), or bee stings. Symptoms could include itching, redness, swelling, shortness of breath, and even anaphylactic shock.

Risks

What are the risks of taking bee pollen?

- Pollen allergy: Taking bee pollen supplements can cause serious allergic reactions in people who are allergic to pollen. As already mentioned, symptoms can include itching, swelling, shortness of breath, light-headedness, and severe whole-body reactions.

- Bee pollen is not safe for pregnant women. A woman should also avoid using bee pollen if she is breastfeeding.
- It is recommended that people who are susceptible to allergies or asthma, or people with hay fever should avoid intake of bee pollen.

Nevertheless, pollen allergy like hay-fever, concerns mainly allergy against air-born pollen, while allergies to ingested pollen are relatively rare, with a similar rate as other foods. According to a 2008 Russian study the incidence to pollen ingestion, tested in 891 normal humans was 1.45%. (SMIRNOVA, V, 2008).

If one has any medical conditions, they should check with a doctor before they start using bee pollen regularly. It might not be safe for people with allergic asthma, blood disorders, or liver disease. People who take bee pollen for allergies could actually aggravate their symptoms if they are allergic to any of the pollens in the supplement.

Interactions

Bee pollen may cause increased bleeding if taken with certain blood thinners. People should consult their doctor before taking bee pollen if they take any medications or herbals.

If one takes any medicines regularly, they should talk to their doctor before they start using bee pollen or pollen supplements. However, bee pollen has an anti-allergenic effect and there is a successful desensitisation therapy to hay fever by pollen. Claims that a small consumption of bee pollen can desensitise against hay fever are known since a long time.

Bee Pollen Application in Combination with Other Bee Hive Products

Mixing bee pollen with honey will preserve its nutritional value and shelf life. Adding other nutritional products as royal jelly, propolis, honey will only increase its health benefits. They make a synergistic combination of super whole foods, easily absorbed and utilized by the body. Different combinations of bee pollen and other bee hive products are known. Below are some of the most common:

- Bee pollen with honey;
- Bee pollen with honey and cinnamon;
- Bee pollen with royal jelly and honey;
- Bee pollen with royal jelly and propolis.

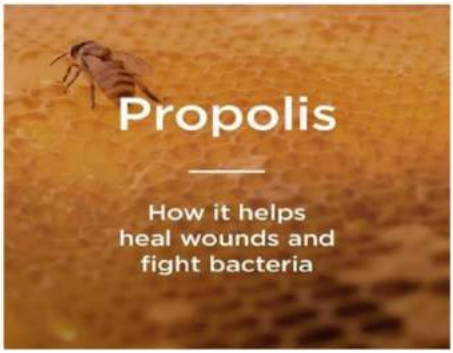
In addition, ground bee pollen can be mixed with honey, cottage cheese, yogurt. Granules can be blended to create ground pollen, which can be added to smoothies or sprinkled over salads. It's better to soak pollen over night to ease digestion.

Bee pollen is available at many health food stores. It could be found in natural dietary supplements, as well as in skin softening products.

7. Propolis and Its Features/Properties

What is Bee Propolis?

First of all, propolis is very different from pollen. Propolis is not created by the bees, but it is collected from plants and flowers and then transported back to the hive: it is a resin-like material made by the bees from the buds of poplar and cone-bearing trees (poplar and conifer trees, for example). Propolis is rarely available in its pure form. It is usually obtained from beehives and contains bee products. Bees use propolis to build their hives. On the other hand, propolis is produced when bees collect resin and then mix it with beeswax and enzymes to create a dense substance similar to glue or putty. It looks weird, too.



Since bees use resin to produce propolis, we can understand why this substance is crucial to bees by taking a look at how resin benefits trees. Tree resin seals over any wounds that the tree might develop. If an organism tries to invade the tree, it will become trapped in the resin and eventually the organism will die because of the toxic nature of the resin. Because of its high antiseptic quality, it helps prevent diseases almost like a natural antibiotic. So, you can see how resin is important to the overall health of the tree. Well, this same resin helps the bees in a similar manner.

How Do Bees Use Propolis?

The bees use propolis in a number of ways. An important use is to reinforce their hive's structure. They use the propolis like carpenter's caulk or glue and deposit it in small gaps and holes in their home to protect and sanitize it. They will also use this substance to repair damaged cells and help make the hive waterproof. And if that was not enough, propolis also protects the hive from intruders. If a bug or rodent enters the hive and the bees cannot remove it, normally it would decay and infect the hive. But the bees will not let that happen! They just encase the intruder in propolis (like mummifying it) so that it does not cause disease or contamination of the hive.

Characteristics and Properties of Propolis

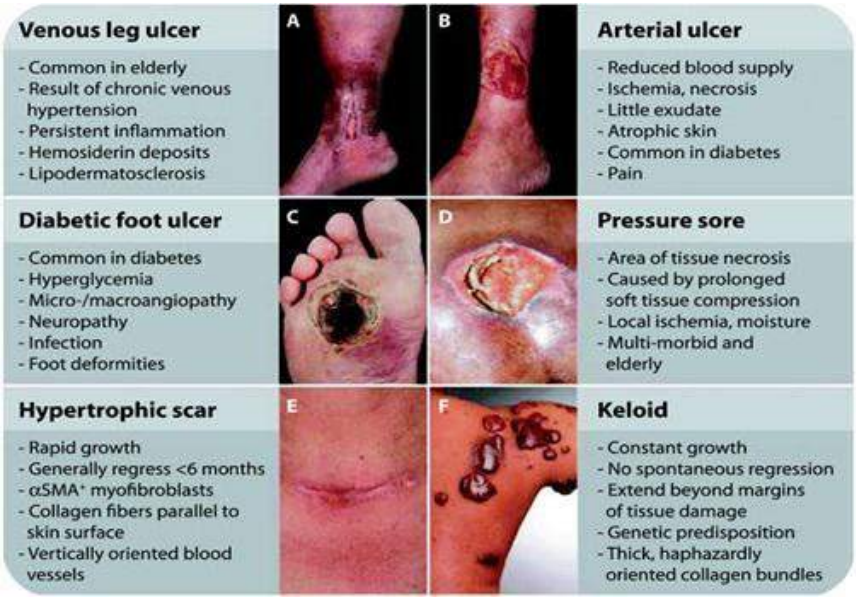
The characteristics of bee propolis are generally dependent on the source of the resin that the bees use to produce the propolis. In most cases, bee propolis is brown, but it can also range in colour from red to yellow or green and even black, but, like mentioned before, its colour is dependent on the source of the resin. The taste of propolis has been described as sour or even bitter, and some have said it tastes like turpentine. It tastes a little piney, not the best-tasting thing in the world, but we can get past the taste when we remember how powerful this substance is for the body.

As we mentioned earlier, propolis has an impressive list of benefits. It is antibacterial and antifungal, and so it should be not surprising to learn that ancient civilizations used propolis to heal and prevent ailments. Today, propolis is used in much the same way – as a natural supplement or in herbal medicines. It is often combined with pollen, royal jelly, or other products to create an effective, natural antibiotic. Today, people are looking for alternatives to antibiotics since they have been overprescribed and are becoming ineffective.

Propolis in all its forms – extracts, tinctures, powders, tablets, ointments, and sprays – are all usually available for purchase at any health food store as well as online.

What Is It For?

Propolis is active against bacteria, viruses, and fungi. It also has anti-inflammatory effects.



Propolis is used for swelling (inflammation) and sores inside the mouth (oral mucositis). It is also used for burns, canker sores, diabetes, genital herpes, cold sores, and other conditions, but there is no good scientific evidence to support these uses.

How to Take Propolis

There are a few options for taking propolis. If your health concern is a sore throat or a problem in your mouth, then a propolis spray is appropriate. If you are looking to use propolis externally or topically, you can buy propolis ointment or propolis cream. A tincture might be a good idea if you want to add propolis to a mouthwash. If you want to take it internally, you might find it easy to swallow capsules. Also, keep in mind that propolis is not a sweetener, so it will not spike your blood sugar level even though it has many of the incredible benefits of honey. Another huge benefit for those struggling with metabolic issues!

Therapeutic Effects

Possibly Effective for:

- Swelling (inflammation) and sores inside the mouth (oral mucositis): most research shows that rinsing the mouth with a propolis mouth rinse helps heal sores caused by cancer drugs or dentures.
- Burns: early research shows that applying propolis to the skin every 3 days might help treat minor burns and prevent infections; Canker sores: early research shows that taking propolis by mouth daily for 6-13 months reduces canker sore outbreaks;
- Dengue fever (a painful disease transmitted by mosquitos): research shows that taking propolis helps people with dengue

fever leave the hospital faster. It is not known if propolis helps with symptoms of dengue fever;

- Diabetes: research shows that taking propolis may slightly improve blood sugar control in people with diabetes. But it does not seem to affect insulin levels or improve insulin resistance;
- Foot sores in people with diabetes: early research shows that applying a propolis ointment to sores on the feet of people with diabetes might help the sores heal faster;
- Genital herpes: early research shows that applying a 3% propolis ointment four times daily for 10 days might improve healing of lesions in people with genital herpes. Some research suggests that it might heal lesions faster and more completely than the conventional treatment 5% acyclovir ointment;
- Gingivitis (a mild form of gum disease): early research suggests that using propolis in a gel or a rinse might help prevent or reduce signs of gum disease;
- Helicobacter pylori (a digestive tract infection that can lead to ulcers): early research shows that taking 60 drops of a preparation containing Brazilian green propolis daily for 7 days does not reduce H. pylori infection;
- Herpes labialis (cold sores): early research shows that applying ointment containing 0.5% to 3% propolis five times daily improves healing time and reduces pain from cold sores;
- Infection of the intestines by parasites: early research suggests that taking a 30% propolis extract for 5 days can cure giardiasis in more people than the drug tinidazole;
- Thrush: early research suggests that using Brazilian green propolis extract four times daily for 7 days can prevent oral thrush in people with dentures; Periodontitis (a serious gum infection): early research shows that deeply rinsing the gums with a propolis extract solution decreases bleeding of gums in people with periodontitis. Taking propolis by mouth helps to prevent loose teeth in people with this condition. But taking

propolis by mouth does not seem to help with plaque or bleeding;

- Tinea pedis (athlete's foot): early research shows that applying Brazilian green propolis to the skin decreases itching, peeling, and redness in students with athlete's foot;
- Upper airway infection: there is some early evidence that propolis might help prevent or reduce the duration of common colds and other upper airway infections;
- Vaginitis (swelling – inflammation – of the vagina): early research suggests that applying a 5% propolis solution vaginally for 7 days can reduce symptoms and improve quality of life in people with vaginal swelling;
- Warts: early research shows that taking propolis by mouth daily for up to 3 months cures warts in some people with plane and common warts. However, propolis does not seem to treat plantar warts;
- Wound healing: early research shows that using a propolis mouth rinse five times daily for 1 week might improve healing and reduce pain and swelling after mouth surgery;
- However, if people are already using a special dressing after dental surgery, using a propolis solution in the mouth does not seem to offer additional benefit;
- Improving immune response;
- Infections;
- Inflammation;
- Nose and throat cancer;
- Stomach and intestinal disorders;
- Tuberculosis;
- Ulcers;
- Other conditions.

Side Effects and Safety

Just like any other substance, if you are allergic (usually people who are allergic to bee stings or other bee products), you may experience side effects. For instance, you may get an unpleasant rash when it is applied to the skin. Kids under the age of one should not use bee propolis or honey. Their systems are not mature and they may have strong reactions to these natural substances. It is advisable to start slowly and with small amounts if you have never used propolis in the past. Propolis is not a sweetener, so it will not spike your blood sugar level even though it has many of the incredible benefits of honey. Another huge benefit for those struggling with metabolic issues!

When taken by mouth: Propolis is POSSIBLY SAFE when taken by mouth appropriately. It can cause allergic reactions, especially in people who are allergic to bees or bee products. Lozenges containing propolis can cause irritation and mouth ulcers.

When applied to the skin: Propolis is POSSIBLY SAFE when applied to the skin appropriately. It can cause allergic reactions, especially in people who are allergic to bees or bee products.

Today's scientific findings says currently have no information for PROPOLIS interactions.

Special Precautions and Warnings

Pregnancy and breast-feeding: There are not enough reliable information to know if propolis is safe to use when pregnant or breast-feeding. Stay on the safe side and avoid use.

Asthma: Some experts believe certain chemicals in propolis may make asthma worse. Avoid using propolis if you have asthma.

Bleeding conditions: A certain chemical in propolis might slow blood clotting. Taking propolis might increase the risk of bleeding in people with bleeding disorders.

Allergies: Do not use propolis if you are allergic to bee by-products including honey, conifers, poplars, Peru balsam, and salicylates.

Surgery: A certain chemical in propolis might slow blood clotting. Taking propolis might increase the risk of bleeding during and after surgery. Stop taking propolis two weeks before surgery.

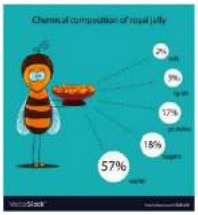
8. Royal Jelly and Its Features/Properties

What Is Royal Jelly?

Royal jelly is a whitish to yellow substance of viscous jelly consistency with pungent and sour aroma. Its taste is sweet and sour. With a density of 1.1 g/mL, royal jelly is soluble in water only partially. Another source describes royal jelly as a homogeneous opalescent and cream to gelatine jelly of white colour with a hint of yellow or ochre. Its taste is spicy, sour to bitter-sour with a pH of 4.0-4.8, and with a typical phenolic aroma.

Royal jelly has been known since ancient Egypt and Rome. Scientific research began as early as 1680 by the Dutch scientist Swammerdan and, in the 18th century, the French natural scientist Reaumur discovered that it is a substance secreted by the pharynx of the bees and titled it as super nutrition. The greatest interest in royal jelly occurred in the 1960s, when Belvefer patented the production of royal jelly under the name Apiserum and became famous all over the world.

Chemical Composition



The major component of royal jelly is water (50-70%), followed by sugars (10-20 %), proteins (10-20%), lipids (3-10 %), and other elements. Sugars mostly consist of fructose and glucose with the similar ratio as in honey. Apart from them, royal jelly contains small amount of maltose, trehalose, melibiose, and ribose. As for lipids, it contains mainly 10-hydroxy-2-decenoic acid and 10-Keto-2-hydroxydecenoic acid. Moreover, royal jelly contains free fatty acids, neutral fats, and sterols including cholesterol. Royal jelly contains the following amino acids: histidine, valine, methionine, tryptophan, and arginine, which is essential for the transfer of nitrogen oxide and which supports growth hormone production.

Vitamins	Minerals
thiamine (B1)	calcium
riboflavin (B2)	sodium
niacin (B3)	magnesium
pantothenic (B5)	potassium
pyridoxine (B6)	zinc
biotin (B7)	iron
inositol (B9)	manganese
Vitamin C	copper
Vitamin D	sulfur
Vitamin E	phosphorus

How Do Bees Use Royal Jelly?

Royal jelly represents an important substance used as nutrition for the queen and future queens, as well as for the larvae of drones and working bees in the first three days of life. One-day old larvae weight approximately 0.1 mg. Nursing bees visit larvae a few times per hour and feed them with royal jelly, which provides complex substances for their growth. The amount of royal jelly fed by bees differ and depending on the bees feeding the queen larvae, working bee larvae, or drone larvae. The biggest amount of royal jelly is consumed by the queen, which is surrounded by several bees offering her royal jelly all the time. Eventually, the royal jelly causes the vitality and strength of the queen. In fact, the queen can lay 1 500-2 000 eggs per day (the weight of all eggs laid in one day exceeds her own weight) or one honeycomb with size of 16 dm2. The composition of royal jelly and its frequent consumption allows the queen to live 3-5 years, while the average lifespan of a working bee is 1 month.

Production and Storage

Royal jelly can be produced in two ways:

- Natural production – during the swarming period, bees create many queen cells full of royal jelly in order to make new bee queens. The harvesting period is, generally, from April to June.
- Production by grafting – this method is executed in four stages:
  1. Cell production- artificial queen cells are made of wax, wood, plastic, or plastic queen rearing box;

2. Preparation of starting colonies- so called starter is a hive with enough honey and pollen supplies without presence of queen and open brood;
3. Grafting larvae- process of transporting 12-24 hours old larvae from honey comb to prepared queen cells by special spoon and putting it in prepared starter;
4. Harvesting –royal jelly is harvested from 3 – 4 days old larvae in queen cells.

Royal jelly can be produced in various form:

- fresh royal jelly mixed with honey;
- in a lyophilized form;
- as dry powder;
- as pills.

Royal jelly is a very sensitive organic substance and contact with metal is not recommended. Furthermore, royal jelly is sensitive to sun light, heat and oxygen, therefore it should be stored and conserved immediately after harvest. In general, royal jelly can be stored in pure form or as mixture with honey (1.5 g of royal jelly and 250 g of honey). Royal jelly should be stored in dark glass jars with temperature between 0 and 10℃. In some cases, royal jelly is stored in alcohol or in mead.

Consumption and Dosage

The best way of consumption is in raw form. The recommended dose is 0.5 grams per day, in the morning, on an empty stomach, 20 minutes before the first meal, using 5 ml syringe under the tongue. The usage period should be 2 to 4 weeks.

For everyday usage:

- Royal jelly in honey mixed with pollen and propolis. In general, it is 1 gram of royal jelly and 250 grams of honey. Daily intake is 1 teaspoon 30 minutes before breakfast for a period of 40 days;
- Children receive half the dose.

Therapeutic Effects

Besides rich nutrition content, royal jelly possesses various biological activities, effects, and healing properties.

Royal jelly is used in the treatment of the following problems:

- Hair loss;
- Improving physical and mental health;
- Diminishing sight;
- Acne;
- Healing of wounds and burns;
- Insomnia;
- Anaemia;
- Angina pectoris;
- Asthenia (general weakness);
- Depression;
- Arteriosclerosis;
- Arthritis;
- Encephalitis;
- Liver disease

- Colon inflammation;
- Treatment of peptic ulcers;
- Duodenal ulcer;
- Insufficient development of children;
- Multiple sclerosis;
- Parkinson's Disease;
- Bronchial asthma;
- Blood pressure adjustment;
- After surgery;
- In convalescence.

Therapeutic effects

- Antibacterial effect;
- Immunomodulatory activity;
- Antiallergic activity;
- Reproduction system and fertility;
- Physiological effect;
- Anti-aging effect.

Biological activities of royal jelly:

- Antiaging;
- Antioxidant;
- Antitumor;
- Neurotropic;
- Anti-inflammatory.

Royal Jelly in Diet, Nutritional Products, and Cosmetics

Royal jelly can be described as a superfood due to its rich nutritional value and many functional properties. Furthermore, the highest consumption of royal jelly was reported in Japan and it is linked to the longevity of the citizens. Royal jelly is used as a supplement for professional athletes for better performance including swimmers and football players. Due to skin protective properties, it is commonly used as an ingredient in natural cosmetics.

- Anti-fatigue;
- Antidiabetic;
- Bio-stimulatory;
- Life-prolonging;
- Anti-aging;
- Anti-osteoporosis;
- Gastroprotection;
- Skin protection;
- Radiation protective;
- Anti-oxidative (against chronic diseases).

Side Effects and Safety

Children: if royal jelly is consumed by children for long periods, it could cause undesirable acceleration of their sexual maturation. Therefore, it should be consumed in lower amounts and mostly if the child has a slower development.

Oncological patients: Royal jelly foster cell growth including tumour cells, therefore oncological patients should not consume it. The only exception is the situation when patient is under permanent medical supervision.

Person with low blood pressure: it is not recommended to consume royal jelly if a person has already a low blood pressure.

Allergies: Royal jelly should be used as a food-ingredient or medicine only after an allergy test due to possible risk of asthma, anaphylactic shock, or bronchial spasms.

Scientific sources do not indicate any interactions with medical drugs or any adverse effects.

9. How to Become a Farmer Entrepreneur

What Is a Farmer Entrepreneur?

In general, an entrepreneur is "someone who produces for the market" and who:

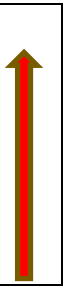
- Assumes responsibility for both profits and losses;
- Is a determined and creative leader (he is always looking for opportunities to improve and expand his business);
- Is an innovator (he is always looking for better and more efficient and profitable ways to do things);
- Is passionate about growing his business (he is constantly looking for new opportunities;
- Likes to take calculated risks.

A Farmer Entrepreneur is a small-scale farmer who:

- Is more market-oriented;
- Learns to calculate risks to open or create new markets for their products;
- Looks for better ways to organize their farms;
- Makes decisions based on what is possible (and not on what they need);
- Tries new crops and cultivars, better animals, and alternative technologies to diversify production, increase productivity, increase profits, and reduce risks.

Conditions for Success

To be a successful entrepreneur, you need to evolve as shown below:

Farming exclusively for the market	Farmers are interested in profits, not in food production	
Farming primarily for the market + Some home consumption	Farmers are limited by access to finance, labour, and market **information**	
Farming primarily for home consumption + Marketing surplus	Farmers are not "entrepreneurs" in the true sense and neither are they truly market-oriented	
Farming exclusively for home consumption	Farmers lack security in terms of food, health, shelter and water	

A farmer entrepreneur will live and work in an ever-changing, uncertain, yet complex and dynamic economic, natural, political and social environment where he will have to deal with:

- Agents, persons who manage business, financial, or contractual matters on behalf of another person or group;
- Commercial services, technical services, specialized care services, and delivery services;
- Competitors, organizations engaged in commercial or economic competition with others;
- Extension workers, persons assisting small farmers in transition from traditional to improved production practices in the developing world;
- Finance agencies, bodies responsible for the regulation, supervision, and oversight of the financial and payment systems, including markets and institutions, which aim to promote financial stability, market efficiency, and client-asset and consumer protection;
- Government, the group of people with the authority to govern a country or state; a particular ministry in office;

- Input suppliers, persons or institutions supplying energy, finance, information, people, or raw materials to be put into a system (economy, manufacturing plant, etc.) to obtain a desired output;
- Markets, areas or arenas in which commercial dealings are conducted;
- Technology support such as Internet, websites, etc.

Basic Types of Entrepreneurship

Farmer entrepreneurs have to choose between **individual entrepreneurship** and **group entrepreneurship**. Group entrepreneurship has both advantages and disadvantages.

Advantages:

- It draws on farmers' common desire to advance economically;
- It draws on farmers' shared business/life experience;
- It has greater power from pooled resources;
- It is solidary;
- It protects the farmers from such enemies as exploitive traders and markets.

Disadvantages:

- It could be challenged by the farmers' low economic status and, thus, not have enough money to invest;
- It could fail with serious financial and livelihood repercussions;
- It might not rely on clearly defined roles and decision-making processes because of the large number of farmers;
- It risks to create dependency on extension workers.

How Does a Farm Enterprise Develop?

There are five stages in the development of a farm enterprise:

In the Establishment stage:

- Challenges relate to basic business skills (necessary to negotiate with banks and other agencies in order to get assistance), farmer's motivation, market potential, and resource availability;
- The focus is on making sure the new product is produced, gets to market, and is sold;

In the Survival stage:

- Challenges relate to entrepreneurial skills;
- The focus is on the relationship between the income earned and the costs entailed (generating enough income to break even in the short run, expanding / diversifying production according to market demands, thus ensuring long-term viability, and replacing the capital equipment);

In the Early growth stage:

- Challenges relate to more managerial skills and qualities;
- The focus is on the growth of the enterprise (developing a broader product and buyer base, finding the information needed for better management, hiring more skilled staff to cope with the increased production, marketing and management activities, and making farm operations more efficient);

In the Rapid growth stage:

- Challenges relate to broader entrepreneurial and managerial skills;
- The focus is on the growth of the enterprise by increasing the amount of land planted and / or raising more livestock, or by adding value to the product by processing it and/or packaging it;

In the Maturity (and possible decline) stage:

- Challenges relate to entrepreneurial skills;
- The focus is on keeping land size, market opportunities, and the scope of activities in balance

Barriers to Entrepreneurship

In your struggle to become a Farmer Entrepreneur, you will come across the following barriers to entrepreneurship:

- Absent / Poor infrastructure (inadequate market facilities; inadequate storage facilities; irregular supplies of electricity; poor roads leading to markets; etc.);
- Lack of education and training facilities and support;
- Lack of financial support;
- Lack of support services and trained extension staff to advise and support the identification, the preparation, the designing, and the implementation of efficient farm businesses (inadequate and inefficient support services; lack of farm management advisors, etc.);
- Marketing constraints (lack of reliable and timely market information; limited purchasing power; negative attitude of buyers; poor communications, infrastructure and marketing facilities; etc.);

- Social barriers (dependence; fear of failure; hopelessness; lack of appreciation for creativity and innovation; lack of support for women-entrepreneurs; unacceptability of individual businesses; etc.);
- Unsupportive laws and regulations regarding banking laws, business law, land ownership, land tenure, tax law, trading regulations (ability to buy, sell, and hire land; complexity of business regulations; extent of bureaucratic procedures, etc.).

Challenges

You may have to face one or more of the following challenges as a Farmer Entrepreneur:

- Access to finance and credit to add processing, to expand production, to hire transport to get to market, to upgrade equipment is tricky because:
    - Farmers are not always aware of sources of finance;
    - Farmers cannot get credit because their incomes are too low, because they have no credit history, or because they lack the required collateral (they have few assets);
    - Farmers may be trapped into using local moneylenders who may not be honest;
    - Farmers need skill and experience in negotiating fair contracts to make sure they protect their interests;
    - Farmers need to understand how credit works (particularly repayments and interest);
    - Farmers need to understand the difference between credit for long-term investments (equipment, machinery) and credit for operating capital for production inputs and other seasonal production costs;

- Access to information provided through extension and support services (leaflets, learning groups, posters, radio, etc.), that should:
  - Be easy to access;
  - Be organised, packaged and communicated in ways that are helpful to Farmer Entrepreneurs;
  - Focus on business management, contacts, market possibilities, prices, etc.;
  - Focus on production technologies;
  - Provide the information at affordable costs;
  - Provide the information in time;
- Access to education and training:
  - Basic education needs for the farmers who are struggling with basic survival;
  - Basic level of business skills, literacy training and numeracy training for market-oriented farmers selling surplus produce;
  - More specialized training in entrepreneurship for farmers who run their farms as a profit-making business and invest profits back into the business to generate farm growth;
- Distance to markets;
- Experience;
- Financial situation;
- Interest;
- Land size;
- Low bargaining power, which:
  - Can force farmers to accept lower prices for their produce;
  - Can force farmers to buy inputs and equipment at higher prices;
- Market-related risk is higher:
  - When farmers focus entirely on producing one or two products for the international market;

- When farmers produce exclusively for the market;
- When farmers produce for a local market which can become over supplied (hence, low prices and low profitability);
- When markets are not completely predictable;

- Vulnerability to economic shocks such as:
  - Adding fees for services;
  - Additional market requirements (changes in packaging requirements, fees, taxes);
  - Changes in interest rates;
  - Changes in prices for inputs and products;
  - Relocation of markets;
  - Unexpectedly low yields or crop failure.

Added Value

You can add value to your products:

- By entering into production and marketing contracts (between farmers and input suppliers, between farmers and other buyers, between farmers and processors, etc.):
  - Market-specification contracts, in which you agree to produce to an agreed quality;
  - Production management contracts, in which the buyer participates in production management through inspecting production processes and specifying input usage;
  - Resource providing contracts, the buyer (who often owns the product) supervises production and supplies key inputs and pays you by volume;

- By integrating with or buying into the value-adding enterprises along the value chain such as:
    - Pre-production enterprises, businesses that supply inputs and other resources such as equipment, fertiliser, pesticides, seed, and tools;
    - Post-harvest handling of products enterprises, businesses that provide post-harvest operations and processes that add value to products (cleaning, cooling, labelling, packaging, transport, and marketing);
    - Post-harvest processing of products enterprises, businesses that process agricultural commodities into more refined products (cooking, curing or drying meat; create handcrafts with commodities such as grasses and flowers; drying fruits and vegetables; milling maize and other grains; mixing commodities such as nuts and raisins; etc.);
- By selling differentiated high-value products (a unique type of meat, organic honey, etc.) for a limited niche market;
- By selling products at a time of the year when few other farmers can compete;
- By selling your regular fresh produce directly to consumers.

Production Efficiency

You can enhance and manage efficiencies in production:

- By changing the production system to one that is less costly (giving up the way one normally does things even if it has been done that way for a long time), which means you need to:
    - Consider purchasing fewer inputs and materials;
    - Make better use of equipment and machinery;
    - Use more on-farm resources (labour, waste products);

- By looking for inputs that cost less, but give the same or better production results;
- By reducing the level of money invested in equipment;
- By sharing machinery ownership to reduce ownership costs (repair and maintenance costs) and benefit from better mechanical technology (with farmers who have similar sized farms and produce similar products.

Farm Business Management Skills

As a Farmer Entrepreneur, you need to develop your farm business management skills:

- Financial management skills, important because profit can be determined only if income and costs are accurately recorded;
- Labour management skills, important for production management and for risk management, especially as the farm grows and relies on more employees;
- Marketing skills, important because marketing is the key to profits;
- Risk management skills, critical because entrepreneurial farming involves great risk.

Core Values

In your relationships with your buyers, consumers, fellow producers, input suppliers, members of producer organisations, and other businesses along the value chain, you need to carry out all areas of work according to the following core values:

Core value	Meaning
Caring	being kind, compassionate, considerate, unselfish and charitable; having regard for the well-being of others
Fairness	avoiding conflicts of interest; being impartial; being reasonable and consistent; making decisions based on appropriate factors; playing fair (fair dealing)
Respect	regard for the dignity, worth, independence and essential equality of all people; tolerance of others; treating people with courtesy, politeness and kindliness (building of trust, fair dealing, greater transparency)
Responsibility	acknowledging and performing duties to others and oneself; being self-disciplined and accountable for one's actions
Social responsibility	being law-abiding; contributing to the betterment of society; doing one's share; recognising and living up to community and social obligations
Trustworthiness	actions are consistent with words; includes such values as dependability, integrity, keeping promises, loyalty, and reliability; worthy of trust and confidence (building of trust, fair dealing, greater transparency)
Truthfulness	honest and true in all business dealings (when selling produce, about weights and measures, quality and safety)

Strategic Management

To compete, progress and meet your goals, you need strategic management, i.e. planning a strategy (an overall long-term plan for the farm business), implementing it, monitoring its outcomes, and adjusting it over time as conditions change. Examples of strategies for your farm management:Business stabilizing strategies:

Business stabilizing strategies:

- Adequate income, when your business is expanded until it generates adequate income for you;
- Full employment, when your business is expanded until your family members are fully employed;
- No change, when your current farming business meets your goals;
- Profit, when you decide to sacrifice future growth by using the income generated for consumption purposes and not reinvesting profits into the business;
- "Wait and see", when you think the current economic and business environment is too uncertain for expansion and decide to wait until it has improved before expanding;

Income increasing strategies:

- Adding value to the enterprise, i.e. increasing income by adding value to existing or diversified enterprises depending on buyer needs (for example, adding almonds to your honey);
- Differentiating the product, i.e. making your produce different and better than those of your competitors by:
    - The information about your buyers;
    - The nature of the product;
    - The way it is distributed;
    - The way the product is presented;
- Diversifying, i.e. increasing the number of products being produced and sold (and, implicitly, the sources of income and the risk of loss) by looking at under-utilised resources on the farm, unfilled demand, and your knowledge and skills to identify what additional produce to produce;
- Expanding the size of the business, i.e. increasing sales, physical and financial assets of the farm through:

  - Capacity expansion through more land under crops and/or more heads of livestock (to spread costs over more production); Modernisation of the assets for more efficient production;
  - Duplication / Replication of existing farm operations in (a) different location(s) when you cannot expand your enterprise at the current location;
- Integrating:
  - Horizontally, when your farm joins with other farms to produce the same product;
  - Vertically, when your farm controls or is involved in one or more "links" in the value chain;
- Lowering costs, i.e. focusing on producing products at the lowest possible cost by finding less expensive resources and inputs, by increasing volume to reduce per-unit cost, or by using more efficient production systems;
- Specialising, i.e. reducing the number of enterprises in the farm business to just a few that receive the full attention of the farmer to meet market demands.

A Good Farmer Entrepreneur

Good Farmer Entrepreneurs are characterized by:

	***Competitiveness*** (being competitive and goal-driven, and **taking initiative**)
	***Confidence*** (being positive, persuasive, and self-confident, and taking risks)
	***Core values*** (being honest and trustworthy)
	***Drive*** (being determined, highly energetic, and highly motivated, and persevering)
	***Flexibility*** (being **adaptive**, flexible, and open to change, and tolerating ambiguity)
	***Problem-solving skills*** (being creative, **imaginative**, innovative, and a **problem-solver**, and learning from failure)

How to Develop Knowledge and Entrepreneurial, Managerial and Technical Skills?

To be a competent Farmer Entrepreneur, you need:

- Knowledge, that:
  - can be obtained from experience (one's own or other farmers'), extension work, information (verbal, visual and written), observation, tradition (perpetuated by your parents and grandparents); need to be about:

- all key areas of farm management (planning, implementing, and controlling);
- your direct functions (primary production, harvesting, processing, wholesale, and retailing);
- your support functions (advisory services, financial services, input supply, packaging, promoting services, transport, etc.); rely on your level of education (especially literacy and numeracy);

- Entrepreneurial Competencies
- Managerial Competencies
- Technical Competencies
- Response to the Changes
- Stages to Become an Effective Entrepreneur
- Suggestions for the Practice of Apiculture

Entrepreneurial Competencies

Competency	Knowledge	Skills	Behaviour
Ambition (having strong desire and will to achieve goals)	Understanding the challenges to be faced	Having strategies to cope with setbacks	- Being highly motivated to achieve goals - Being not put off by setbacks - Being patient - Coping with stress
Creative thinking (coming up with creative and innovative ideas and solutions)	- Understanding the farm business as a system - Understanding the opportunities that arise - Understanding the problems	- Finding relevant **information** - Generating new ideas - Matching **information** and ideas to opportunities and problems	- Assessing the options - Developing actions for implementation - Diagnosing the farm business and its parts - Identifying opportunities - Selecting the most appropriate options

	facing the farm business		
Flexibility & adaptability (readily **adapting** to new and changing situations)	Being aware of the changes affecting the farm business	- Analysing situations and developing coping strategies - Generating creative ideas - Locating new resources and **information**	- Being highly motivated to achieve goals - Being not put off by setbacks - Being patient - Coping with stress
Focus on problem-solving & decision-making (having a strong desire **to solve problems** and seize opportunities)	- Understanding the decision-making process - Understanding the opportunities that arise - Understanding the problems the farm business faces	- Generating, evaluating and choosing alternatives - Identifying problems and opportunities - Implementing and monitoring the chosen alternative - Locating, gathering and organising data relevant to the problems	Actively look for effective ways of **solving problems**
Initiative (showing the willingness to work)	Understanding what is required to succeed	- Creating and clearly expressing a vision for success - Setting realistic but challenging goals	- Keeping working until the job is done - Showing willingness to take the first step - Working well independently (without supervision)
Interpersonal abilities (having the ability to work with others, especially those who are different)	- Understanding people and how they work - Understanding relationships and when they are strong or weak	- Opening two-way communication - Sharing and encouraging others to share	- Being honest and trustworthy - Working well with people of all kinds
Networking (establishing effective partnerships	Knowing who the key stakeholders and partners are	- Maintaining contact with partners,	Being trustworthy and honest in all dealings

and relationships)		markets, suppliers, etc. - Negotiating and making deals	
Readiness to learn (actively looking for new knowledge and skills & learning from mistakes)	- Keeping informed about learning opportunities - Knowing how to learn	- Analysing and identifying when new knowledge or skills are needed - Setting learning goals	- Being **curious** - Taking command of learning
Strategic thinking (having a good vision of business and strategies for achieving goals sustainably)	Being aware of the changes and risks affecting the farm business	- Analysing situations and developing long-term strategies - Finding ways of achieving the goals	- Creating a vision of the farm business - Developing strategies to achieve goals - Setting goals
Taking risks (actively showing willingness to take risks to achieve the goals of the farm business)	- Knowing how to evaluate risks - Understanding the risk for each decision	- Analysing and weighing the risks in terms of costs and benefits - Developing risk management strategies	- **Adapting** to risks and adopting new strategies - Calculating the risks involved - Learning from failures or mistakes - Pursuing risk mitigating measures

Managerial Competencies

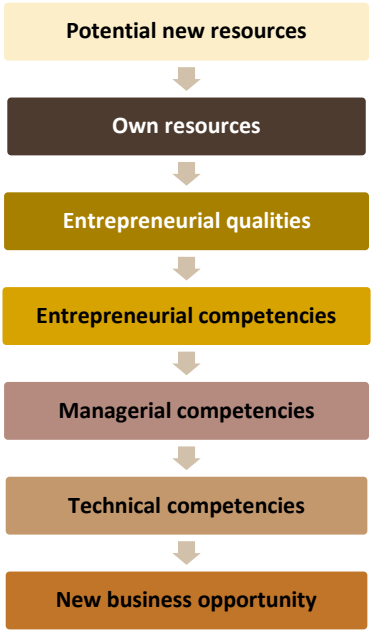
Competency	Knowledge	Skills	Behaviour
Controlling (monitoring of activities and comparing performance and results against planned expectations regularly)	Understand the value of control and its influence on profits	Keeping accurate records Monitoring and comparing	Being methodical Paying attention to detail
Diagnosing (analysing the farm business to identify problems and opportunities that affect profitability)	Understanding the input, production and marketing requirements of each enterprise	Analysing the farm business to identify problems and opportunities Identifying solutions and actions	Identifying solutions Identifying the root causes of a problem Learning from others
Evaluating (assessing the outcomes of the farm business and the impact of decisions)	Understanding the impact of each area of the farm business on profits	Identifying which actions give which outcomes	Being objective and methodical
Leading (guiding and supporting staff in achieving the goals)	Understand how to motivate people	Assessing performance Communicating	Being trustworthy Building trust Encouraging
Organising (preparing to implement the plan)	Knowing what and when resources and materials are needed and where to get them	Following sequential steps Finding and securing resources	Being determined Being methodical
Planning (identifying and selecting actions to take to achieve a goal)	- Knowing the goals and objectives - Knowing the range of alternatives to achieve - the goals	Identifying, evaluating and choosing alternatives Outlining the steps and resources needed to implement alternatives	Being methodical Thinking in advance
	-		

Technical Competencies

Competency	Knowledge	Skills	Behaviour
Managing inputs (identifying, sourcing and acquiring inputs for the farm)	Knowing what inputs are required for each enterprise and where to obtain them	Applying inputs correctly Keeping records of input use and results	Being ready to experiment with new inputs Looking for better quality inputs, lower prices, & more efficient alternatives
Managing marketing (being able to do profitable marketing of farm products)	Knowing where the most profitable market for each enterprise is	Keeping records of transactions Negotiating contracts	**Adapting** quickly to market changes and market opportunities Looking for more profitable markets
Managing production (identifying, organising and implementing production on the farm)	Knowing the most profitable and sustainable way to produce each enterprise	Keeping correct records for all production activities Ploughing, planting, pest control, weed control, harvesting (for crops) Rearing, feeding, watering, disease control (for livestock)	Being mindful of time Being ready to experiment and try out new systems Looking for more efficient production systems

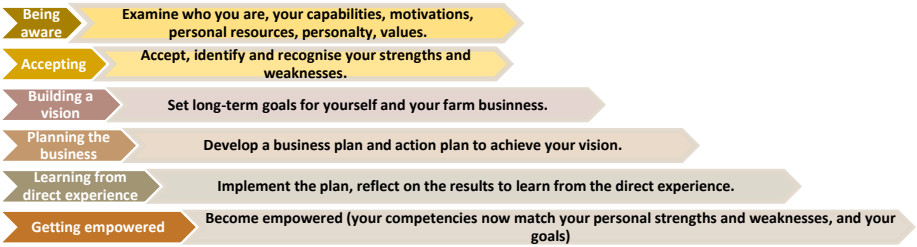
Response to the Changes

To respond to the changes affecting your farming environment and to develop and implement a new business opportunity, you will have to combine farming competences and entrepreneurial competencies with the resources available:



Stages to Become an Effective Entrepreneur

To become an effective entrepreneur, you will have to go through the following stages:



Suggestions for the Practice of Apiculture

Of course, nobody is expecting a farmer to acquire overnight all Agricultural Entrepreneurial / Managerial Knowledge and to develop all Agricultural Entrepreneurial / Managerial Skills and Agricultural Entrepreneurial / Managerial Work Styles. However, he is expected to acquire some knowledge and develop a few skills in their agricultural field of choice. Here are a few suggestions for the practice of Apiculture:

- **Beekeeping business planning:**
  - Comply with government & industry regulations;
  - Develop and follow a business plan;
  - Plan the winter and spring season;
  - Schedule production season activities;
  - Understand owning and growing a beekeeping business;
- **Employability skills:**
  - Combat a small fire;
  - Communicate and interact effectively with others;
  - Demonstrate knowledge of basic personal finances;

- Handle hazardous farm materials safely;
- Maintain health and safety on the job;
- Maintain health and safety while working with bees;
- Manage time effectively;
- Manage your training and continuing education;
- Perform basic emergency and first aid procedures;

- **Handling bees:**
  - Demonstrate understanding of basic bee biology and behaviour;
  - Demonstrate understanding of pollination requirements;
  - Describe bee specialty enterprises;
  - Feed the bees sugar and protein;
  - Perform field work with colonies;
  - Perform field work with queens and cells;
  - Perform routine field work;
  - Prepare for winter and complete related activities;
  - Receive and install package bees;
- **Maintaining bee health:**
  - Control parasitic mites;
  - Manage vandals and wildlife;
  - Minimize pesticide damage;
  - Prevent brood diseases;
  - Prevent Nosema disease;
  - Use integrated pest management strategies;
- **Operating bee equipment:**
  - Describe functions and design of buildings;
  - Extract honey and wax;
  - Maintain hive equipment;
  - Operate and maintain forklifts, boom trucks, power tailgates;
  - Operate and maintain trucks, trailer and accessories;
  - Operate small tools and accessories;
  - Use basic handle and power shop tools.

Good Practice Examples: Slovakia

Bee farm „Bee Alchemy“

Propolis

We are a small family bee farm located in eastern Slovakia in the Ondava Highlands. There is no industrial area far and wide, no plants treated with pesticides in agriculture, only pure nature. When treating bee colonies, we mainly use biological measures and we are trying to implement natural beekeeping. We have completed various apitherapy courses with certificates, we have participated in BLESABEE project, which focuses on organic beekeeping. We educate new beekeepers, organise beekeeping courses and promote apitherapy and beekeeping in public.

We are engaged in the production and processing of traditional bee products and less traditional for this part of Europe, such as apilarnil, tincture from wax moth, propolis suppositories and others. The offer highly varies and is constantly expanding. Our products are in high quality and always fresh – they are produced regularly in small quantities. The feedback from customers is very positive.

Website: https://www.vceliaalchymia.sk/

E-mail: vcelia.alchymia@gmail.com

Propolis in cosmetics

The use of propolis is very huge, the products that we produce are only a fraction of the possibilities and we are constantly expanding the offer

itself. Propolis can be used in all ways - by inhalation, entry through the skin, orally, rectally, vaginally and through other mucous membranes, such as the mucous membranes of the eye. We choose the path according to the specific problem.

We must not forget the main fact: 10% of propolis is soluble in water, 20% in fats and 70% in alcohol. Different components of propolis dissolve, which of course have different effects. Therefore, it is often advisable to combine products. At the same time, we know that the composition of propolis itself is variable, depending on the geographical location, the weather and the season. Let us not forget that in combination with other bee products there exists so called „synergistic effect“. The use of raw propolis in dry form has very little effect, as the body has only water component. Therefore, mixing it with honey, as we often see, has minimal effect. However, it is true that for certain health problems, it can also make a significant therapeutic sense.

Fig.: Royal

Products

- propolis tincture - Slovak propolis (it comes mainly from poplars) is one of the best.
- propolis liqueur - for gastritis, stomach ulcers, duodenitis.
- propolis products for people who cannot drink alcohol:
- propolis butter and propolis chocolate - for diseases of the stomach (inflammation of the stomach, stomach ulcers), inflammation of the duodenum, lung diseases, tuberculosis and swelling.

- propolis oil – for skin inflammation, sunburn, rheumatic pain
- propolis suppositories - treatment of haemorrhoids, prostatitis. One way to get more propolis into the bloodstream directly.
- propolis suppositories with sea buckthorn oil - gynaecological problems, such as vaginitis and cervical spasms caused by pathogenic fungi or bacteria, itching of the womb, erosion of the cervix. Accelerates the healing of difficult-to-heal wounds after gynaecological operations.
- honey with propolis extract and thyme oil - the equivalent of medical honey
- propolis powder - powder base with healing properties of propolis, especially for facial problems
- raw propolis - addition to curry eyes
- inhalation of propolis - whether raw in specialized devices, extract or tincture (after at least a slight evaporation of alcohol) during steaming or even from a drape
- propolis ointments - in combination with herbal ingredients and a suitable natural base, they achieve remarkable results. We combine them with Kostihoj medical,

Common Marigold, Aloe vera, Ceylon cinnamon, coniferous resin or just with hemp oil itself.

Excellent results are not only achieved against eczema in case of one-year-old children, but also in case of seniors with musculoskeletal problems.

Apipraktik

Various bee products and apitherapy

Etami s.r.o. (later changed name to Apipraktik) began to deal with the sale of bee products for apitherapeutic purposes in 2015, when also published a Slovak translation of the book Practical Apitherapy by a Russian doctor, apitherapist N. Z. Cismatullinová. In the same year, the manager Iveta Krajňaková, as well as MUDr. Libor Marko, the company's professional guarantor, took part in a certified apitherapy course in Perm, Russia, under the auspices of the local medical university. The manager then completed two more apitherapy courses. Based on the experience gained and partnerships in Russia and Ukraine, where the tradition of apitherapy is also significant in professional circles, Etami s.r.o. in the second half of 2016 with its own production of mixed honeys and the sale of nutritional supplements based on bee products through its online store apipraktik.sk. At present, the range of produced and sold under the heading "apipraktik" consists of mixed honeys, tablets and liquid balms. The combinations are chosen so as to achieve a therapeutic effect. Comprehensive programs that benefit from combinations of individual bee products cover the treatment of problems such as boosting immunity, acne, diabetes,

fatigue, digestive problems, cardiovascular problems and infertility. A specific area in which society achieves excellent results is the therapy of children diagnosed with autism spectrum disorder.

Autism and how bee products may help

Both the physical and mental side is very fragile in humans and is connected not only with vitamin supplementation, exercise in nature but also diet. These knowledge and experiences have led us to do the therapy with autistic people. With our 6 years experience with bee products, autism and diet, we have come to the conclusion that this combination is important for successful treatment.

Diet is very important when cleansing with bee products. A properly set diet for autistic children is the key. When adjusting the diet, the most problematic symptoms, such as aggression, mood swings, self-harm, abdominal pain, bloating, irregular stools, fatigue or irritability, are largely eliminated. Health problems are associated with permeable bowel syndrome, which causes gluten and casein to be broken down in the body into peptides, gluteomorphins and caseomorphins. The good news is that diet and supportive therapy with bee products help to restore the intestinal microflora and subsequently regenerate the intestinal tract.

Website: https://www.apipraktik.sk/

E-mail: info@apipraktik.de

The course of therapy

NUTRITION: A typical one-sided diet for autistic children is rich in sugar, which is addictive. Refined sugar promotes inflammation in the body, it is toxic to the body. Children have the lack proteins, minerals and vitamins. Conversely, sugar deprives the body of vitamin A; B; C and minerals such as calcium, magnesium, potassium and chromium. When eating with a lack of nutrients (frequent anaemia ...), these

children suffer and their body takes these nutrients directly from the bones and other parts of the body.

Bee products contain a whole range of vitamins, including B, mineral and trace elements enriched with polyphenolic compounds, flavonoids, phenolic acids and their derivatives, natural hormones and many other biologically active substances. In our practice, nutrient replenishment is mainly through PERGA and APILARNIL has a leading place.

PERGA, thanks to its rich content of essential fatty acids, has a positive effect on growth defects, depression or nervous diseases. It has antibiotic activity against gram-positive pathogens. As already mentioned, these children have a problem in the digestive tract and intestine, which is exactly what perga restores with a normal balance of intestinal microflora and improves the condition of the lining of the digestive tract. It supports appetite and at the same time it improves liver function and stimulates bile production. It contains coenzyme Q10, which suppresses oxidative stress in children.

APILARNIL plays an important role especially for the content of vitamin B12.

DETOX: In general, autistic people also have problems with immunity. Various inflammatory processes take place in their body, most of them in the digestive tract.

Other bee products that we apply for their anti-inflammatory properties are mainly PROPOLIS, BEE VENOM and BEE CHITOSAN.

BEE VENOM contains melitin, one of the most active components of bee venom. During therapy, we massage children 's feet, hands and cervical spine with this cream.

PROPOLIS is the most natural product against parasites and viruses. Flavones, phenolic acids and their esters can disrupt and affect the life cycle of viruses and bacteria. Flavones and caffeic acid derivatives suppress yeasts of the genus Candida, which are the cause of various diseases. We recommend using mainly water propolis, ie propolis

modified with a special technology without the use of alcohol, as children use it for a longer period of time during this therapy. Propolis, like other bee products, acts as an antioxidant in the body due to its rich presence of polyphenols (a substance capable of binding toxins, free radicals and leaching them out of the body). There is even a study claiming that the antioxidant effect of propolis is 6 times stronger than other known antioxidants. To be specific, propolis contains, for example, caffeic acid, cinnamic acid, β-coumaric acid, galangin, quercetin or chrysin.

APICHITOSAN, and its combination with water propolis, is one of the most effective strategies for removing toxins from the body.

Due to the flavonoids present, perga is similar to propolis, but in addition, as we have already mentioned, it also contains coenzyme Q10, carotenoids, vitamin E or zinc, which are also considered antioxidants.

Conclusion

Instead of concluding, we present our one case study. But before that happens, we must not forget to mention that we approach the application of bee products to improve the condition of children with autism at most individually. We also consult with mothers on any, even the smallest changes in behaviour or diet. Also, during therapy, children must strictly follow a diet without milk, gluten and sugar and consume enough water for the process of "detoxification" to take place successfully. And most importantly, children's progress is also not possible without active cooperation with psychologists and speech therapists.

Case study

Our first small client, Aďko S., was 4 years old at the time of the start of therapy and was newly diagnosed.

His diagnosis was made by a pediatric neurologist on November 7, 2016. It states:

- delayed speech development
- mild mental disability
- autism spectrum disorder
- central hypotonic syndrome

A 4-year-old had imperfect social contact, he did not make visual contact, he played alone, he only spoke certain words, he only consumed mixed soup."

We started the therapy in 2016 and used the products for 2 and 1/2 years.

Although he first went to a special kindergarten, then he went to a private one. My mother communicated intensively with the teacher and we watched his behaviour in the team. Although for the first month he just watched the children and played alone. Gradually, during the second and third months, he got closer and closer to the children, he started playing in a team. He stopped escaping during walks after the second month.

For the first half of the year, the mother carried the soup to the nursery, he ate food in the nursery only after a few months. At home Ad'ko tastes new dishes, fruits, vegetables and meat after the second month.

Ad'ko started making eye contact within a month, repeating words and sentences from the third one. Gradually he learned new words, names objects according to pictures, connects sentences and begins to understand. The speech therapist could worked with the child because his concentration has improved. After a year, Ad'ko talked without cards, but his mother still had to fix him, because he did not speak correct forms of word in sentences.

The principal of the kindergarten where Ad'ko went visited us and told us how his behaviour had changed since the beginning of the therapy. They took him to his nature school without his parents for a week, he managed it very well.

He is currently attending primary school in the 2nd grade. He has an assistant and manages the curriculum very well. He has joined the team and has no problem making contact with children.

Association „kRaj“

Beeswax, services in apiculture

The association kRaj has been implementing its activities for 13 years in the districts of Poltár, Lučenec and Rimavská Sobota with implementing activities at the national level. The main theme of the organizations is education about pollinators and their challenges for the country.

In Kokava nad Rimavicou, association runs an educational apiary, where members teach about the importance of bees for the country. This apiary is also used to educate future and current beekeepers and very popular beekeeping courses are implemented here. The part of apiary is also dedicated to apitherapy and visitors can help themselves to use the hive air by its inhalation. An important part are also beekeeping courses specially focused on the education of the long-term unemployed people and people from vulnerable groups. After completing the course, the association provides the basic equipment and hives so that participant can start their own beekeeping practice, during which the graduates have additional support from the association. Association also provides help in the form of marketing and assistance in selling bee products. Under the common brand Fair Honey, these graduates can sell their products. However, their products are not lost in anonymity and despite the common visual, each manufacturer has its own description and contact on the label.

Since 2014, kRaj has had a social entrepreneurship program in addition to the environmental themes. The cooperation takes place with social services home Slatinka in Lučenec, where we trained clients to process bee products. They know how to process certain types of candles and we help them sell their products. In Kokava nad Rimavicou, we collaborated with the Roma community on a similar project.

The association also runs a small carpentry workshop, which currently offers a job opportunity for one person who produces atypical bee hives, insect houses for solitary bees. In 2021, it is planned to offer work for another person.

In 2020, from February 1, the social workshop Voštinári has been operating in the village of Utekáč. It processes beeswax into candles. In addition, the production of balms, creams and beeswax from beeswax is planned after obtaining certificates.

Website: https://kraj.sk/

E-mail: info@kraj.sk

Association „Štiavnica Mountains“

Api-House, services in

Štiavnica Mountains is a association and its goal is to implement an educational activities focusing on the health, mental and physical development of an individual with respect to ecology, healthy lifestyle and sustainable life based on respect for the biodiversity of all living organisms and nature.

Based on the experience with the guests, association is aware of the general low level of knowledge about bees and treatment with bee products. For this reason, we decided to spread awareness in this direction and to educate the general public about the so-called apitherapy, which is the oldest natural healing method with bee products.

The association „Štiavnica Mountains“. is located in the protected landscape area of the Štiavnica hills where it operates an API-house, www.vcelihotel.sk . APi house enables sleeping or staying in the apiary directly above the beehives. Sleeping on hives is an ancient natural way of rest and relaxation, after the old beekeepers began to realize the positive effect on the body while staying in the apiary. Life, or biofield, is the energy produced by bees within a radius up to 1 m from the cluster, i.e. the place where a new bee life is constantly born and where there is the highest concentration of bees. Together with the ubiquitous propolis, which is highly disinfectant and permeated with all the air in the API-house. Its scent is clear and even sharp. It is generally said that there is a more sterile environment in the brood of bees than in the operating room. And since we don't take anything from these bees at all, we just take care of them in a natural way without chemicals. In season, the house is literally like a honey paradise.

If the air is in contact with a sterile environment, it itself becomes sterile. Such sterile air naturally circulates through the space of the API-house and constantly sterilizes itself. Sterile air flowing naturally in bee hotels automatically binds microscopic particles of pollen, honey, propolis, royal jelly, bee venom and wax. The air contained in these healing particles is then inhaled. The volatile particles of honey and pollen contained in the hive air have a favourable effect on the mucous membrane of the bronchi and thus reduce their congestion and swelling. The smell of bee venom suppresses the migration of lymphocytes into the tissue and thus slows down the allergic reaction. Propolis in combination with bee venom fumes has anti-inflammatory, antibacterial and antiviral effects and disinfects the respiratory tract. The air in the

apiary is clean, transparent and healing. The bees in the API-house must be in the best possible condition, free of diseases and should not be used for non-medicinal effects. The big advantage of our API-house is its location. As we are located in a protected landscape area, without pollution and the use of any chemical pesticides, bees have a rich and varied source of nectar, pollen and propolis throughout the season. Which, of course, increases the positive effect of staying in our API-house.

What diseases can be treated by staying in API-house?

The only official, clinical study that exists is the treatment of multiple sclerosis. The efficacy of the stay in the API-house for other diseases has not been clinically documented. but verified by many years of experience of beekeepers and worldwide observations collected over decades. Staying in API-house is recommended for the treatment of all respiratory diseases, multiple sclerosis, ADHD, autism, stress, skin diseases, candidiasis or mycoses. Breathing air in the apiary lowers blood pressure and improves blood composition. One breathes slower and calmer. In general, a stay in API-house is beneficial for any treatment. And when it comes to a specific treatment, it is a sweet respite that is beneficial to each of us.

Who is not recommended to stay in API-house?

Definitely not suitable for allergy sufferers to bee products - honey, pollen, propolis, or to bee stings. Severe cancer patients. People suffering from severe infectious diseases, pregnant and lactating women. Before visiting API-house, it is not recommended to use significant perfumes and other narcotics that could irritate the bees and take away from the natural scent by which API-house is scented.

How often should a stay in API-house be taken?

In our bee hotels we offer the option of either a 2-hour stay during the day or an overnight stay. And how often to complete such a stay? As

often as you enjoy it, as it is based on individual approach and self-feeling.

Why the hexagonal shape of a API-house?

The geometry of the apiary is constructed in the principle of sacred geometry. This geometry is the basic building block of us and of all manifested life. It is the basic language of the universe. By perceiving the sacred geometry, the right and left cerebral hemispheres are connected, i.e. the polarities are unified when we enter the consciousness of Oneness. The flower of life as a symbol of sacred geometry is the bearer of hidden meanings and represents the connection of everything that exists here on Earth. The flower of life is called a flower because it represents the cycle of a fruit tree. The fruit tree produces flowers that undergo metamorphosis and become fruit. The fruit contains a seed from which, when it falls to the ground, another tree grows again. It is the cycle of nature, infinitely repetitive, which is the source of pure consciousness. The flower of life can also be geometrically drawn as a 6-angle, which is the basis of a bee cell. And that is why we chose this shape chosen as the basic shape of the API house. All sides are the same not only on the outside, but also on the inner structure is built on the principle of sacred geometry, where the exact dimensions and angles are observed. At the same time, there are 2 triangles facing each other, which intersect. So, a symbol of a man and a woman that intersect. Or as they say, both in heaven and on earth. Whatever we call it, it is still a unity that is behind duality. And how do bees know? no one knows, they don't think about it like we humans do. They are simply like that from their nature. And just this natural shape of a bee house built according to the sacred geometry in the shape of a flower of life has a beneficial effect on the human body.

CERAMEL – family bee farm in Slovakia

Various bee products

CERA MEL s.r.o. is a family bee keeping business run by Grgula family for more than 30 years. The words cera and mel have Latin origin meaning wax and honey and literary describe the scope of the company's business- beekeeping, production of honey, pollen, propolis and beeswax candles. Grgula family started keeping bees just before 1990 when they received 12 hives as a wedding gift and continued beekeeping tradition that remains within their family for four generations. Zdenka and Dusan Grgula take care of beekeeping, production and logistics. Their son with his partner are responsible for sales, marketing and new product development. Yearly average production is 17 tons of honey and 4 tons of beeswax.

Today, Grgula family runs bee farm in a village of Choča in the Zlaté Moravce region, brick and mortar shop in the town centre of Bratislava, honey kiosk in Avion shopping mall, e-shop www.medovyobchod.sk and pop-up stalls at markets and fairs. Their shop and stalls are a place where customers can taste, smell and try all their products, the website is rather a marketing and communication tool. The bee farm with around 150 hives attracts hundreds of people every spring and summer. Visitors can walk through and relax in the bee garden full of herbs and bee pollinated flowers, get to know the life of bees in open hives, have a look at the manufacturing process, make their own beeswax candles and honey soaps or taste more than 14 types of honeys. The current production of honey and beeswax from their own hives does not cover the demand, therefore, Zdenka and Dusan co-operate with other small beekeepers who make up the missing amounts of bees' products.

CERA MEL s.r.o. focuses on mono floral honeys, namely, rapeseed, sunflower, acacia, linden, forest and pine tree honey. They also produce blends of acacia honey and various nuts. However, their main speciality is flavoured honey- combination of set honey, freeze dried fruits and spices. Examples of such combinations are honey with strawberries, raspberries, cinnamon and plums, ginger, cocoa and hazelnuts or exotic passionfruit.

Products, such as, propolis extract in alcohol and oil, bee pollen and royal jelly naturally complement their product portfolio. The aim of the company is not to sell honey and bee products only as a commodity in a large jar but they focus on adding value to them. Therefore, they use honey in their baked goods such as gingerbread or shortbread or cosmetics based on honey, pollen, propolis, beeswax and royal jelly. Their cosmetics range include healing and protective lip balms, hydrating hand creams and body lotion, body oils infused with propolis and essential oils and hand sanitiser with propolis. Acacia and pine tree honeys produced by CERA MEL s.r.o. have been awarded by a golden star at a prestigious Great taste Awards taking place in London, UK, every year. Bee garden visits, rapeseed and acacia honey and their home-made honey cookies have been certified as regional products of Ponitrie.

Website: https://www.medovyobchod.sk/

E-mail: info@ceramel.sk

Good Practice Examples: Poland

Beeyes

Bee Venom

"Beeyes" is a company founded in 2014 that specializes in the use of bee products in cosmetics and dietary supplements. These are products for people for whom a healthy lifestyle is especially important. Mainly bee venom, propolis, royal jelly and pollen are used. "Beeyes" is a solid brand using innovative and modern ways of production and presentation of cosmetics and dietary supplements.

Website: https://beeyes.pl/

Email: info@beeyes.pl

The hive-based company products

The most popular BeeYes products are all kinds of cosmetics based on bee products such as bee venom or propolis. Effective anti-age products are e.g. bee venom and honey serum in an ampoule, bee venom face mask or cream, bee venom and Manuka honey UMF20+ eye cream, beeswax hand cream.

Description of best practices

Polish natural cosmetics with bee venom and honeydew honey from the BeeYes Bee Venom Eco line include a serum in ampoules and a face cream for day and night. It is an innovative combination of honeydew honey and bee venom. The caffeine used in the serum stimulates microcirculation, while apitoxin rebuilds protein cells. It makes a very good base for make-up. The beeswax in the cream makes the skin more elastic and the honeydew honey soothes irritations. Field poppy oil perfectly nourishes mature and delicate skin, and the "youth vitamin" E delays the skin ageing process. BeeYes cosmetics used in daily face and neck care effectively moisturise, smooth, regenerate and improve the overall appearance of the skin, providing a rejuvenating effect.

Innovation & SWOT analysis

- Innovation: bee venom-based cosmetics combined with honeydew honey and caffeine
- Strengths: Those products improve the skin tone, smooth the skin, moisturise the skin, soothe wrinkles, regenerate the epidermis, reduce pore size, increase skin firmness and elasticity. Apitoxin rebuilds protein cells.
- Weaknesses: counterindications in asthma; bee-sting, pollen, propolis allergy.
- Opportunities: possibility of improvement in both effectiveness and range.
- Threats: competition from similar companies, fake organic ingredients, drop of sales.

Miodowa Mydlarnia

Beeswax

"Miodowa Mydlarnia" is a company that produces cosmetics using honey, propolis, pollen and beeswax. Due to their natural moisturizing, nourishing and lubricating properties, the cosmetic products are healthy and effective. The soap shop mainly produces soaps, face butters, lotions and scrubs, but also perfumes, candles and other accessories.

Website: https://miodowamydlarnia.pl/

Email: sklep@miodowamydlarnia.pl

The hive-based company products

The Soap Shop sells natural cosmetics made using the "cold process " such as soaps, scrubs, masks, lip balms, hand lotions and bath powders. All, without exception, soaps made by “Miodowa Mydlarnia” contain beeswax.

Description of best practices

In "Miodowa Mydlarnia", the entire process of manufacturing cosmetics is handmade, according to the principles of traditional cosmetic craftsmanship, while maintaining absolute diligence at each stage of production, from the preparation of the recipe, through the preparation and creation of the cosmetic, to the packaging. Beeswax is rich in biologically active substances, whose ideal composition allows for effective care of even the most sensitive skin types. It contains proteins, lipids, carbohydrates, vitamins, mineral salts and microelements. They have moisturising, greasing, regenerating and protective properties. Wax prevents the skin from drying out, makes it more flexible and soft and does not allow the epidermis to lose water. It protects the skin from the sun, cold and environmental influences and is therefore ideal for daily skin care.

Innovation & SWOT analysis

- Innovation: beeswax-based soaps dermatologically safe for all skin types
- Strengths: Beeswax is used in cosmetics as a natural antimicrobial and anti-inflammatory agent, effective also in the treatment of wounds, burns, ulcers and boils. Its lubricating, smoothing and antibacterial properties make beeswax an excellent soap ingredient. In addition, beeswax acts as a natural preservative, extends the shelf life and solidifies the consistency of soap.
- Weaknesses: None.
- Opportunities: possibility of improvement in both effectiveness and range of products.
- Threats:
    - competition from similar companies;
    - fake organic ingredients;
    - drop of sales.

Hawran apiary

Bee Pollen

"Hawran" is an apiary with roots in the pre-war period, when Antoni Patoka started his beekeeping work. After the war, he handed his hives with 120 bee families to Piotr Hawran. Today, his son Paweł Hawran has developed the apiary up to 450 bee families. He emphasizes high quality and purity of the products. He uses the method of cold application of honey into jars, which helps preserving the medicinal and taste properties of the products. Multiflower honey, royal jelly, bee pollen, feather and propolis are being used for that.

Website: https://pasiekazpasja.pl/

Email: kontakt@pasiekazpasja.pl

The hive-based company products

The company produces honeys of various flavours and with the addition of various bee products. For example bee pollen (10%) and propolis forte (2%) are added to multi-flower honey. This honey has antibiotic and anti-inflammatory properties. Its taste is bitter-sweet and its consistency, after the process of cold application, is spreadable without noticeable lumps. Buckwheat honey is also produced with the addition of pollen (5%) and propolis (1%). Apart from that, the company sells buckwheat pollen itself, which supports the supplementation of protein deficiencies, as well as heather pollen, which supports the treatment of hypertension and digestive ailments, or multiflower pollen, as a source of many vitamins, such as: D, E, K, B1, B2, B6, B12, C, PP.

Description of best practices

"Hawran – Pasieka z Pasją" is the only company in Poland that puts emphasis on the innovative way of filling and packaging - not heating up bee products. Already at temperatures higher than 42 degrees, bee products lose their properties. The heating process is necessary for practical reasons in mass production, so that the honey does not crystallize in the jars. In the process, the living elements of honey are lost, such as amino acids, essential oils, inhibitors, natural pigments, immune bodies and enzymes. The aim of the apiary, therefore, is to leave in its products what is most needed by applying the products cold. Fast crystallisation is a sign of the best quality. A a clean environment in which the hives are located is most important. This method involves controlling the environment and working closely with local farmers and foresters. This awareness of the interrelationship between the micro- and macro-elements of the ecosystem enables the bees to extract what is purest from nature.

Innovation & SWOT analysis

- Innovation: cold applicated pollen-based products.
- Strengths: pollen and pollen-based products:
  - are recommended for people with protein and vitamin deficiencies, hypertension and digestive ailments
  - work as antibiotics and have antibacterial and anti-inflammatory properties
- Weaknesses: counter indications for infants, for people with allergies to hive-products

- Opportunities: possibility of improvement in both effectiveness and range of products.
- Threats:
  - competition from similar companies;
  - influences of the environments around the hives on the products.

Pasieka Morawskich

Propolis

„Pasieka Morawskich" is a company lead by Mateusz Morawski who, with the help of a mentor, quickly and professionally developed his passion into a very valuable apiary. He breeds bee queens for his own needs and specializes in producing customized wraps. He produces organically certified honeys. In the production he uses bee honey, bee pollen, bee quilt, wax candles, propolis and various other organic products.

Website: http://miodymorawskich.pl/

Email: pasieka@miodymorawskich.pl

The hive-based company products

Propolis is used both internally and externally. For internal use, propolis drops are used. Propolis tincture is made by dissolving bee putty in spirit. A solution of a few drops of propolis in water can be drunk or gargled in the mouth and throat. Honey with propolis has a beneficial effect on the mucous membrane of the mouth and throat. Propolis ointment is used for external application. It is applied to the surface of the skin at the site of the injury. Propolis ointment is also extremely effective for skin lesions associated with bacterial and fungal infections. Raw propolis can also be used externally. In this case, a lump of bee

putty is warmed in the hand and crushed. A portion of propolis prepared in this way is applied to the skin and covered with a dressing.


Description of best practices

„Pasieka Morawskich" is an apiary producing ecological honey. It's special, because ecological apiaries in Poland are rare. The requirements imposed on the apiaries that apply for an ecological certificate are extremely difficult to meet in those specific climatic conditions. There are less than 30 apiaries in our country which produce Polish organic honey. Therefore, it is very difficult to buy it and the price of this product is higher than honeys obtained in conventional apiaries. However, ECO honey is worth its price. They produce ecological multiflower/honeydew or acacacia honey as well as ecological bee pollen and ecological propolis.

Innovation & SWOT analysis

- Innovation: ecological propolis-based products
- Strengths: Propolis and propolis-based products:
  - consist of resins and balsams collected by bees from the buds of young plants, inhibins and enzymes, which inhibit the formation of microorganisms added by bees
  - have strong antifungal, antibacterial and antiviral properties, accelerates the process of wound healing, and has strong analgesic properties and is used to treat burns and bedsores.

- are effective in the treatment of upper respiratory tract infections and tracheitis

- Weaknesses:
  - People who are allergic to bee products should be careful when using propolis drops, as bee putty is usually responsible for these allergies
  - Due to the ethanol content, it is not recommended to drive vehicles directly after taking propolis tincture
  - Opportunities: possibility of improvement in both effectiveness and range.
- Threats: None

Pasieka Łysoń

Royal Jelly

"Pasieka Łysoń" has a long tradition dating back to the 1950s. The founder Marian Łysoń specializes in developing beekeeping equipment. Since 1995 the company has continued under the name "Lyson" and has been run by the founder's family. It is a response to the demand for natural and healthy products whether in cosmetics or confectionery. Healthy products are made with the use of propolis, bee pollen, royal jelly and honey.

Website: https://pasiekalyson.pl/

Email: kontakt@pasiekalyson.pl

The hive-based company products

The shop of the Łysoń apiary sells natural honey, honey with 0,08 % royal jelly, royal jelly itself, energy bars, chocolates and lollipops with honey, lemonades and honey gingerbread, truffles and honey fudge. You can also buy beeswax candles and natural cosmetics made of bee

products. We can find it in the composition of creams, lotions and liquids based on royal jelly. It can be applied to any type of skin. Cosmetics containing this product stimulate cell metabolism and normalise the activity of sebaceous glands. The milk has a beneficial toning effect on the skin and improves its hydration and elasticity. Its content in cosmetic preparations ranges from 0.5 to 10%.

Description of best practices

The company "Łysoń" has started to produce "Miodowita" (Vitality) – an innovative product, which combines the 4 most valuable products from the Łysoń hives – pollen, propolis, royal jelly and natural Polish honey. It has a strengthening effect for those, who perform intensive physical or mental work. The combination of the given ingredients will eliminate weakness and make you immune to all types of bacterial infections. In the case of fighting anaemia, this product is invaluable and very effective. Provides the body with the nutrients it needs to function efficiently – by supplying a package of vitamins and almost 95% of Polish honey. Systematic application leads to increased vitality and provides an increase in energy on a daily basis.

Innovation & SWOT analysis

- Innovation: Api-Fusions with royal jelly
- Strengths: Royal jelly

  - has a strengthening effect, removes fatigue, increases efficiency at work, improves mood and concentration, regulates metabolic processes, improves appetite, memory and eyesight, lowers serum cholesterol levels and significantly lowers blood pressure
  - is used in treatment of cardiovascular diseases and inflammatory conditions of gall bladder, pancreas, liver and large intestine and of hard-to-heal wounds, bedsores, burns, ulcers
- Weaknesses: none.
- Opportunities: possibility of improvement in both effectiveness and range.
- Threats: competition from similar companies, drop of sales.

Good Practice Examples: Romania

Apimond – From nature heart

Bee Venom, Royal Jelly and

"Apimond – From nature heart" has been a Romanian traditional brand since 1921. It manufactures and sells products from the hive (bee venom, beeswax, honey, pollen, propolis, royal jelly) as well as products based on beehive products such as anti-dandruff shampooing, anti-wrinkle creams, hydrating creams, hygiene liquid soaps, hygiene serums, intimate hygiene gels, liquid soaps, rejuvenating creams, rejuvenating masks, tinctures, and treatment serums.

Website: https://apimond.ro/

Email: apimond@gmail.com

The hive-based company products

"Apimond – From nature heart" does not sell bee venom and propolis as such, but it manufactures six bee venom-based products with ingredients from organic farming: Apiremed gel with bee venom and arnica; Apiremed gel with bee venom and capsaicin; Bee venom treatment serum; Rejuvenating bee venom cream; Rejuvenating bee venom mask; Rejuvenating eye contour bee venom cream.

The company also manufactures six propolis-based products with ingredients from organic farming: Anti-acne lotion with stem cells; Anti-dandruff shampoo with propolis; Herbal shampoo; Hygienic gel with aloe vera and propolis; Hygienic liquid soap with oreganol and propolis; Intimate hygiene gel with sea water and propolis; Liquid soap with propolis and aloe vera; Liquid soap with propolis and green tea; Propolis tincture; Rejuvenating bee venom cream.

As for Royal Jelly, it manufactures 12 royal jelly-based products with ingredients from organic farming: Active serum with stem cells; All day hydration; Anti-dark circles eye cream; Anti-hair loss shampoo with royal jelly; Anti-wrinkle cream with royal jelly and omega-3; Anti-wrinkle emulsion with royal jelly and omega-3; Day cream with stem cells; Eye contour cream with collagen and royal jelly; Hair regenerating serum; Hydrating serum; Liquid soap with arnica and royal jelly; Night cream with stem cells.

Description of best practices

"Apimond – From nature heart" does not use ingredients that can be harmful to humans such as: additives that encourage the suspension of one liquid in another such as synthetic emulsifiers, anionic detergents and surfactants such as sodium laureth sulphate, anionic surfactants such as sodium dodecyl sulphate or sodium lauryl sulphate, and sodium lauryl ether sulphate, moisturisers such as mineral oils, parabens such as butylparaben, ethyl paraben, methylparaben, and propylparaben, polyether compounds such as poly-ethylene glycol derivatives, preservatives such as phenoxyethanols, surfactants such as alcohol ethoxylates or alcohol ethoxy sulphates, and sodium lauryl sulphate, synthetic colorants such as azo, indigoid, triphenylmethane, and xanthene dyes, synthetic fragrances such as ambroxan, cedramber, evernyl, musks, and vertofix, or synthetic gums such as butadiene-styrene, paraffin, polyethylene and vinyl acetate.

"Apimond – From nature heart" uses bio ingredients in its products, and Apimond cosmetics are marketed as "bio elixir" for a natural beauty. This approach is based on the following: bees are bio-indicators of pollution since they are sensitive and reactive to environmental pollution; bio nutrition is based on bio crops; human body absorbs not only through its digestive tract, but also through its skin, hence the importance of bio cosmetics.

Innovation & SWOT analysis

- Innovation: bee venom-based products that are an alternative to Botox injections; propolis-based products containing a perfect natural antibiotic; royal jelly-based products contain argan stem cells from argan buds.
- Strengths: these products are fascinating cocktails of natural and organic ingredients such as flowers, fruit, products of the hive, and seeds; contain ingredients from organic agriculture; enhance blood circulation and cell restoration; have anti-inflammatory, comforting, cooling, heating, relaxing, thermic (in osteoarticular infections) and deobstruent (in influenza) effects; and regenerate skin.
- Weaknesses: pollen: counterindications in asthma; bee-sting, pollen, propolis allergy; pregnancy; propolis: counterindications in breastfeeding, hepatitis, pregnancy, propolis allergy
- Opportunities: possibility of improvement in both effectiveness and range.
- Threats: competition from similar companies, fake organic ingredients, drop of sales.

Fagurele Cu Miere- The Honeycomb

Beeswax

Fagurele Cu Miere

The company "Fagurele Cu Miere" ("The Honeycomb"), whose apiary is located in the Comana Natural Park in the region of Dobruja, Romania, manufactures and sells products from the hive: apilarnil (a very important natural product obtained from the bee colony, whose discoverer was a very famous Romanian beekeeper, Nicolae Iliesiu), bee bread, beeswax, 100% natural raw honey (not processed, not treated thermically) directly from the beehives, raw

pollen, propolis, and royal jelly, as well as products based on beeswax such as beeswax candles with propolis-treated wicks, bulk beeswax, and christening and wedding beeswax candles.

Website: https://fagurelecumiere.ro/

Email: fagurelecumiere@gmail.com

The hive-based company products

"Fagurele Cu Miere" ("The Honeycomb") manufactures and sells beeswax as such, as well as artisanal beeswax-based products such as:

- bulk beeswax;
- beeswax candles with propolis-treated wicks;
- christening and wedding beeswax candles.



Description of best practices

"Fagurele Cu Miere" ("The Honeycomb") produces:

- beeswax containing healthy components such as coloured substances, esters, fat-soluble vitamins, free fatty acids, hydrocarbons, lactone, mineral salts, and slow carbohydrates;
- handmade candles made from natural wax sheets, with crumbed raw propolis-treated cotton wick: when burning, they exude an aseptic (due to the propolis) smell.

"Fagurele Cu Miere" ("The Honeycomb") does not use paraffin or perfumes in beeswax candles.

Innovation & SWOT analysis

- Innovation: beeswax-based products are made from recycled honeycombs, and they have both aesthetic and health effects.
- Strengths: beeswax-based products:
  - are decorative (due to the honeycomb pattern on the beeswax sheets);
  - have aseptic, bacteriostatic, anti-inflammatory, relaxing, scarring, and smoothing effects;
  - produce a pleasant smell.
- Weaknesses: None.
- Opportunities: possibility of improvement in both effectiveness and range of products.
- Threats:
  - competition from similar companies;
  - fake organic ingredients;
  - drop of sales.

Butoiul cu Miere- The Honey Barrel

Bee Pollen

The company "Butoiul cu Miere" ("The Honey Barrel") has been manufacturing and selling non-processed products from the hive in the region of Maramureș (Northern Romania) for over 30 years: bee bread, beeswax, honey, pollen, and propolis. It is a family-run business and it has three main selling points – in Baia Mare (Maramures County) Cluj-Napoca and Florești (Cluj County) in addition to an online shop (https://www.butoiulcumiere.ro/shop/).

Website: https://www.butoiulcumiere.ro/

Email: office@butoiulcumiere.ro , comenzi@butoriulcumiere.ro

The hive-based company products

"Butoiul cu Miere" ("The Honey Barrel") manufactures and sells pollen as such, as well as artisanal pollen-based products such as: Dry pollen; Forte immune small barrel (acacia honey, propolis and raw pollen); Honey (0.15-0.43% pollen); Immune small barrel (acacia honey and propolis tincture); Maxi immune small barrel (acacia honey with raw pollen); Propolis tincture (5% pollen).

Description of best practices

"Butoiul cu Miere" ("The Honey Barrel") produces pollen and pollen-based products that contain fat-soluble vitamins (A and provitamin A, D, E, F) and water-soluble vitamins (C, P, acid folic, B1, B2, B3, B5, B6, B8), enzymes, esters, fat-soluble vitamins, free fatty acids, hormonal substances, hydrocarbons, lactone, mineral salts, phyto-hormones, pigments, and slow carbohydrates.

"Butoiul cu Miere" ("The Honey Barrel") does not process its pollen-based products

Innovation & SWOT analysis

- Innovation: pollen-based products.
- Strengths: pollen and pollen-based products:
    - are recommended in allergies, anaemia, asthma, breast cancer, cardio-vascular disorders, coughing,

pharyngitis, digestive disorders, haemorrhage, high cholesterol level, high triglyceride level, laryngitis, liver conditions, pneumonia, prostate cancer, restoration of gut flora;
    - have antioxidant, antiseptic, antithrombotic, bactericide, bacteriostatic, anti-inflammatory, tonic, trophic effects;
- Weaknesses: counterindications for infants, for people with allergies to products of the hive.
- Opportunities: possibility of improvement in both effectiveness and range of products.
- Threats:
    - competition from similar companies;
    - fake organic ingredients;
    - drop of sales.

Good Practice Examples: Spain

Carmen García – Apitherapist

Bee Venom

From a very young age she was in contact with the world of bees in the family business, her brothers being beekeepers. Attracted by the health world, she is a nurse and began to specialize in the healing power of honey by attending her first Apitherapy congress in 2006. In 2007 she began her training in Apitherapy with Dr. Vicente Ferrer in La Serena (Chile), professor at the Latin American Institute of Apitherapy. She currently has her practice in Jerez de La Frontera (Cádiz), Spain. She states that when someone tells her: "I don't remember how long ago I was not as well as now ..." the joy and satisfaction are so great that she feels very grateful to the bees, to their patients and to each of the people who they have trusted in and on bees over the years.

Website: https://www.apiterapiajerez.es

Email: info@apiterapiajerez.es

Apitherapy consultation services

In your consultation Carmen offers the following services:

Apitherapy or therapy with bees: consists of the personalized application of the different products of the hive, attending to the needs of each person, to improve their health and quality of life.

Apipuncture or acupuncture with apitoxin: it began in Japan in the year 1920, it is a variant of apitherapy, it consists of the application of poison in the acupuncture points,

combining the action of the poison with the stimulation of these points to alleviate the ailments of diverse etiology.

Description of best practices

To improve the quality of life, prevent and treat diseases in a natural way:

- personalized application of the treatment
- use of high quality organic products
- In the treatment with apitoxin, a technique is used whereby only the stinger remains stuck and the bee returns to its live hive
- ailments treated: treats lumbosciatica, tendonitis, fibromyalgia, osteoarthritis, arthritis, rheumatism, psoriasis and neuropathic pain

Innovation & SWOT analysis

- Innovation: combine apitherapy and Traditional Chinese Medicine
- Strengths: People, who come to this therapy and to the world of bees, tend to develop a greater respect for them, discovering how much they can do for us.
- Weaknesses: No.
- Opportunities: disclosure of apitherapy and its benefits to new patients
- Threats:
    - competition from similar companies
    - lack of confidence of some people towards these treatments.

Granalbe

Beeswax

The Granalbe company is located in the municipality of Segorbe, in the province of Castellón, Spain. It is a third-generation family business, with more than 30 years of experience in the sector, beginning in 1986. The activity of the company is divided into: honey packaging, manufacture of wax sheets and sale of beekeeping equipment. They buy premium quality honey for packaging and send orders for their products throughout the country

Website: https://www.granalbe.com

Email: granalbe@granalbe.com

The hive-based company products

"Grenable" manufactures laminated wax in various formats. In addition, they have other products such as:

- all kinds of beekeeping equipment for the management of hives and the extraction of honey from various manufacturers, in order to offer customers a variety of products
- monofloral bulk honeys of various varieties: orange blossom, lemon, rosemary, thyme, lavender, almond, mountain and forest
- varieties of honeys that depend on the harvest: strawberry tree, eucalyptus, apple tree, avocado, medlar and coriander.

Description of best practices

During its production "Grenable" manufactures:

- 100% pure block and sheet beeswax
- wax sheets of special measures
- in all hive formats: Layen, Dadant, Langstroth and Lusitana
- offer beekeepers the possibility to make sheets of their own wax

They have a long experience of more than three decades in production.

Innovation & SWOT analysis

- Innovation: they adapt to the demands of beekeepers by manufacturing sheets of special measures
- Strengths: innovative beeswax products:
  - sheets and blocks of pure wax that are the basis for the manufacture of candles and other decorative objects from beeswax
  - they commercialize other products such as food for bees, beekeeping material.
- Weaknesses: No.
- Opportunities: possibility to expand your sales among promoter beekeepers if the organic beekeeping sector grows.
- Threats:
  - competition from similar companies
  - fake organic ingredients

Rancho Cortesano Cooperative

Various bee

The Rancho Cortesano Cooperative is located in a small town called El Torno de la Jerez countryside, in the province of Cádiz (Spain). It has a history of more than 30 years dedicated to beekeeping. They have 2000 hives grouped in 40 apiaries located in mountains and natural areas of the mountains where there is an abundant diversity of flowers that give a differentiating taste and texture to honey, which has been worthy of the most important awards for quality that are granted in Spain.

Website: https://www.ranchocortesano.net

Email: miel@ranchocortesano.net

The hive-based company products

"Rancho Cortesano" produces traditional beehive products, such as Honey, Pollen, Royal Jelly, Meloja, Wax and Propolis. In addition, it carries out:

- harvesting, during which the quality of its products has been a constant concern since its inception
- marketing of bee products in the own honey shop and on the website
- to publicize the artisan trade of beekeeper
- weekend workshops



Description of best practices

In its educational effort, Rancho Cortesano has promoted the:

- creation of the Honey Museum (year 2002), an open place with a free visit to show the fascinating world of beekeeping throughout history
- creation of the Restaurante El Huerto-Eco (2012), with the aim of transmitting to new generations the importance of valuing the origin of food and consuming healthy and clean food from contamination
- Ecological-garden that you can visit

Innovation & SWOT analysis

- Innovation: an informative vocation to publicize the health benefits of honey and all the beehive products and the importance of a healthy diet through The Museum, The Restaurant and The Eco-garden.
- Strengths: great diversity of educational products and activities:
    - guided visits to the beehives (schoolchildren, families), making wax candles and self-packing of honey, beekeeping courses, participation in fairs and markets.
    - marketing of high quality products: honey, pollen, propolis, royal jelly, wax, aromatic herbs, candies, chocolate, cosmetics and gift bags.
- Weaknesses: No.

- Opportunities: to spread the benefits of honey and healthy eating among the general population and young people, creating environmentally conscious consumers.
- Threats:
  - competition from similar companies
  - sales drop.

Madrid Miel

Various bee products

Madrid Miel is a company of production and own elaboration of Artisanal, Natural and Ecological honey. It is located in Leganés (Madrid), Spain. It consists of a very long journey in the sector following artisanal standards that have been passed down for generations since 1944. It has its own hives distributed in the best locations for honey production in Spain and Portugal.

Website: https://madridmiel.com

Email: info@madridmiel.com

The hive-based company products

As artisan beekeepers, Madrid Miel takes advantage of everything that the natural environment and the hives produce. For this reason, they package, distribute, sell in store and online bee propolis and pure royal

jelly. Propolis is used in natural medicine to fight infections, fungi, viruses and bacteria.

- the company makes this natural remedy from a mother tincture

- uses a natural combination of echinacea and essential oils from tea tree, which provide soothing benefits for the throat and voice and provide an immediate feeling of well-being.

Suitable for smokers and in cold climates.

Description of best practices

Miel Madrid has diversified its production widely between:

- MADRID HONEY Natural Range and LA ABEJA DORADA Ecological Range: honeys from Orange Blossom, Forest, Eucalyptus, Lavender, Thousand flowers, Lavender, Mountain, Rosemary, Thyme
- produces organic Bee Bread
- has a shop for the beekeeper and hobbyist.

Innovation & SWOT analysis

- Innovation: they make different formats of propolis based on mother tincture and maceration methods with other substances.
- Strengths:
  - wide variety of products with quality awards, Premium products and Delicatessen
  - modern facilities for the processing of products

- wide distribution throughout Spain

- Weaknesses: No.
- Opportunities: continuous investment in the best technologies of extraction and generation of honey combined with the good work of traditional methods
- Threats:
  - competition from similar companies
  - cheaper non-organic products
  - sales drop.

Good Practice Examples: Turkey

Uraw cosmetics

Bee Venom

Uraw cosmetics have been a Turkish traditional brand which was founded in 2015 as Uraw Cosmetic A.Ş. is an e-commerce organization that produces innovative and natural products. It contributes to the beekeeping industry by producing high value-added products from bee products. Uraw cosmetics using bee products, it operates in the fields of face care, skin care, make up, body care and hair care. It manufactures and sells products from the hive (bee venom, royal jelly) as well as products based on beehive products such as, anti-wrinkle creams, serums, hydrating creams, rejuvenating creams, rejuvenating masks, tinctures, and treatment serums.

Website: https://www.uraw.com.tr/tr

Email: info@uraw.com.tr

The hive-based company products

Uraw cosmetics do not sell bee venom directly as such, but it manufactures many different bee venom-based products with ingredients from organic farming.

Description of best practices

- Uraw cosmetics use bio ingredients in its products, and marketed as “bio elixir” for a natural beauty. This approach is based on the following: bees are bio-indicators of pollution since they are sensitive and reactive to environmental pollution; bio nutrition is based on bio crops; human body absorbs not only through its digestive tract, but also through its skin, hence the importance of bio cosmetics.
- Uraw cosmetics, which provides economic contributions to beekeepers by creating value-added products for bee venom, which has not yet found a serious market in the country, has been making qualified products from natural products that humanity has used for thousands of years.

Innovation & SWOT analysis

- Innovation: bee venom-based products that are an alternative to botox injections.
- Strengths: these products are fascinating cocktails of natural and organic ingredients such as flowers, fruit, products of the hive, and seeds; contain ingredients from organic agriculture; enhance blood circulation and cell restoration; have anti-inflammatory, comforting, cooling, heating, relaxing, thermic (in osteoarticular infections) and deobstruent (in influenza) effects; and regenerate skin.
- Weaknesses: counter indications in asthma; bee-sting, pollen, propolis allergy; pregnancy.
- Opportunities: possibility of improvement in both effectiveness and range.
- Threats: competition from similar companies, fake organic ingredients, drop of sales

Balmer

Beeswax

BALMER KARADENİZ ARI ÜRÜNLERİ MERKEZİ

The European Union supported in partnership with the Republic of Turkey; T.R. It is a Common Use Facility established within the scope of the "Arım Balım Peteğim" project implemented under the roof of the "Competitive Sectors Program" and carried out by the Ministry of Science, Industry and Technology. It can process all kinds of bee products and turn them into value-added products. It manufactures and sells products from the hive to the table such as raw wax, wax products, honey, royal jelly, polen …etc.

Website: http://www.bal-mer.com/

Email: balmerkaradeniz@gmail.com

The hive-based company products

In this high-tech facility, all kinds of product analyzes obtained from the hive are carried out within the scope of their standards. The facility acts as an intermediary for professional beekeepers to businesses that market qualified beeswax and other products, enabling the beekeeper to purchase and market high quality products with high added value.



Description of best practices

- Balmer is an expert on bee products, processes honey and beeswax in its facility and works in the field of all other beekeeping products.
- Balmer is a non-profit sectoral service company and serves beekeeping businesses, which is its main target. It provides scientific support in obtaining quality products from natural products that humanity has used for thousands of years.
- Balmer is a fully automatic facility equipped with advanced technology, robotic machines and provides support to the beekeeper by performing precise measurements of beeswax, honey, royal jelly and pollen.
- Balmer packs suitable products that are analyzed in depth in its high-tech laboratory.
- Balmer, Turkey and the European Union food codex shows a high level of care and consistent work.
- Balmer saves time by quickly analyzing beeswax, honey, pollen and all kinds of bee products in its internationally accredited laboratory.

- Balmer produces wax, honey, pollen, etc. with the hygienic facilities in its modern facilities. Produces and provides storage services.

Innovation & SWOT analysis

- Innovation: Balmer places special emphasis on beeswax, as many scientific studies show that beeswax has been used to treat wounds and burns for many years. Innovative beeswax products nourish the skin and, while being produced, act as a shield to new cells, prevent germs and increase cell production rate. There are regenerative products that contain beeswax and other medicinal plant extracts.
- Strengths: Beeswax can be used to help relieve pain on the hands of people with: osteoarthritis, rheumatoid arthritis, fibromyalgia and other joint mobility problems. It acts like a kind of heat therapy and can help increase blood flow, relax muscles and reduce joint stiffness. Beeswax can also minimize muscle spasms and inflammation and treat sprains.
- Weaknesses: Beeswax has low thermal conductivity and as a disadvantage it is a flammable material.
- Opportunities: Can be used in many fields such as health and cosmetics, food, agriculture and textiles.
- Threats: Similar companies are strong competitors and there is a huge amount of fake candles on the market.

DoğalVital

Royal Jelly

As DoğalVital (AksuVital), our goal is to ensure that consumers can obtain Aksuvital Group products online in a fast, reliable and economical manner. The company mission; It aims to be an online website with the mission of bringing the innovations and all the opportunities provided by today's technology to the consumers. Dogal Vital is a subsidiary of Codeonsis Group of Companies.

Website: https://www.dogalvital.com/

Email: info@dogalvital.com

The hive-based company products

Aksuvital Group including bee products, many natural products, processes and markets.

Description of best practices

- As Doğal Vital (AksuVital), our goal is to ensure that consumers can obtain Aksuvital Group products online in a fast, reliable and economical manner. The company mission; It aims to be an online website with the mission of bringing the innovations and

all the opportunities provided by today's technology to the consumers. Dogal Vital is a subsidiary of Codeonsis Group of Companies.

- Doğal Vital which provides economic contributions to beekeepers by creating value-added products for Royal Jelly which has a serious market in the country.

Innovation & SWOT analysis

- Innovation: Royal Jelly products that are an alternative to skin health and immune system support.
- Strengths: Among the health benefits of royal jelly; In addition to helping chemotherapy, include preventing certain types of cancer, lowering blood pressure, treating infertility, lowering cholesterol levels, protecting the liver, reducing inflammation, improving digestive disorders, preventing premature aging, helping to lose weight
- Weaknesses: A large number of counterfeit brands, a product that is easy to counterfeit and understand but takes place in a laboratory environment.
- Opportunities: The possibility of improvement in both effectiveness and range.
- Threats: A large number of counterfeit brands, fake organic ingredients, drop of sales

İDAPOLİS

Propolis

İDAPOLİS® is a research and development company established at Çanakkale Technopark Campus in 2019. The main purpose of the company, which was established by academicians working directly on the subject, is to develop natural and reliable products with high added value by using intensive and up-to-date information from all bee products, especially propolis. The company, which has the status of Technopark company specialized in the field of universities and academics of Çanakkale Onsekiz Mart University and the European Union is constantly scientific cooperation.In this context, Çanakkale Onsekiz Mart University has successfully completed and successfully completed many bee products related projects in TR and EU member countries, and markets high quality products in and outside the country with the İDAPOLİS® Bee products brand.

Website: https://www.idapolis.com.tr/

Email: idapolis@com.tr

The hive-based company products

Idapolis processes the qualified raw materials obtained by contracted beekeeping method from the endemic plant species and rich flora of Mount Ida, where the important endemic flora of the country is located, with scientific methods and obtains high quality products. These products are primarily propolis, spray containing propolis with added value propolis, black oak honey with propolis, black oak honey with propolis black cumin, etc.

Description of best practices

İDAPOLİS which provides economic contributions to beekeepers by creating value-added products for raw propolis, which has been making qualified products from natural products that humanity has used for thousands of years. The company, which has the status of Technopark company processes the qualified raw materials obtained by contracted beekeeping method from the endemic plant species and rich flora of mount Ida, where the important endemic flora of the country is located, with scientific methods and obtains high quality products. These products are primarily propolis, spray containing propolis with added value propolis, black oak honey with propolis, black oak honey with propolis black cumin, etc.

Innovation & SWOT analysis

- Innovation: Propolis based products that are an alternative to botox injections.
- Strengths: The production of propolis by a university team within the university technopark primarily creates trust on consumers. This is an important advantage. Because there are many fake products marketed under the name of propolis in the sector. İdapolis R&D develops smart products by processing propolis, which is well-known today, which is used before the treatment of human and animal diseases, with different medicinal and aromatic plants. These products are used for the protection of human and animal health and provide miraculous results in the treatment of some diseases.

- Weaknesses: Sustainable production of propolis sources, which are negatively affected by global warming, it is a little problem today.
- Opportunities: Covid -19 taught people how important it is to have a strong immune system. In this context, demand for true propolis, one of the most powerful immune system boosters known, has increased. The fact that it is an R&D company that produces in this field and that there are scientists working in the field arouses trust in the society.
- Threats: competition from similar companies, fake propolis brands and ingredients.

Good Practice Examples: Bulgaria

Plamen Enchev

Bee Venom

Dr. Plamen Enchev is a specialist in internal medicine and at the same time for 26 years has been among the few doctors in the country who practice apitherapy treatment with bee products, including bee venom. He uses bee venom in practice by controlled stings at certain acupuncture points. Dr. Enchev has 30 bee families, most of which are housed in his garden with organically grown plants. He regularly participates in world forums of apitherapists.

It is worth mentioning that in Bulgaria less than 10 people practice bee venom therapy.

The hive-based company services

The treatment begins with a bee sting. The number of bee stings gradually increases to two or three sessions per week. In general, the procedure is repeated between 10 to 12 or 20 to 30 times, depending on the disease. Severe diseases require a longer course of treatment.

Description of best practices

First, the patients are selected based on indications and hypersensitivity to bee venom. And secondly, they are selected according to their

motivation. The effect is in many cases long-lasting if a person changes his lifestyle.

Innovation & SWOT analysis

- Innovation: the physician uses a holistic approach - he combines traditional medicine with homeopathy and treatment with bee products.
- Strengths: The treatment can be much safer than modern chemicals
- Weaknesses: fear of allergic contraindications
- Opportunities: huge demand and no competition
- Threats: pollution

Raya Bee Farm

Beeswax

The farm's bees produce honey and bee products, collecting nectar, pollens and resins from the vast spaces covered with wild flowers, shrubs, and trees in the vicinity of the farm's apiaries. The farm produces almost the entire range of bee products like bee honey, bee pollen, propolis, beeswax and Royal Jelly.

Website: http://raya.bg

The hive-based company products

Along with the traditional products from the hive, the farm also offers:

- Lip balms with wax
- Ointments with wax and propolis
- Beeswax patch - beeswax has the characteristic to slowly absorb and give off heat. The slow release of heat to the underlying

tissues causes deep hyperemia. Because of this it is used for health problems requiring heat treatment.

- A variety of wax candles

Description of best practices

The farm produces small quantities of all products and their main focus is the quality and purity of the products.

They offer high quality natural beeswax, well filtered and purified in water, which is of excellent purity, bright color and delicate aroma.

Innovation & SWOT analysis

- Innovation: Apart from online sales of readymade products, the customers can have customised bee wax patches, ointments and lip balms upon request, which farmers prepare individually.
- Strengths: Clean and eco-friendly customised products; A great variety of bee wax candles for different purposes and tastes
- Opportunities: Increasing demand of natural products.
- Threats: Increasing competition from similar farms and e-shops.

Radi's Honey Bee Farm

Bee Pollen

The farm has a total of 180 bee families. The farm's goal is to offer customers high-quality products. They produce a diverse range of several types of honey, propolis, bee pollen, wax, perga (bee bread) and offer their customers clean and natural bee products, the way bees create them in harmony with the environment. The products are sold online.

Website: https://radihoney.com/

The hive-based company products

The farm produces a diverse range of bee products and mixtures, including:

- Natural pollen
- Perga (bee bread)
- Undried (raw) bee pollen in honeydew honey
- Perga (bee bread) in honeydew honey
- Bee immunostimulator 4 in 1 (bee elixir) containing pollen, propolis and royal jelly and honey.

Description of best practices

100% environmentally friendly products, including bee pollen and perga without any antibiotics, additives or sugar. The farm's bee bread (perga) is a hand-made product.

The farm produces small quantities of all products and their prime goal is the quality and purity of the products.

Innovation & SWOT analysis

Innovation:

- The products offered contain no antibiontics, additives or sugar. Bee bread is collected by hand. The farm offers plenty of useful information on the benefits of the bee products on their web site and social media channels.

Strengths:

- Located in a fertile and clean area;
- Good quality control;
- Almost no mechanized processes.

Opportunities:

- growing demand for healthy products;
- motivated staff.

Threats:

- competition from similar companies;
- fake organic ingredients;
- infavourable weather conditions;
- farmers' pesticides
- drop of sales.

GHoney
Propolis

Various bee

GHoney – brand for natural superfoods and cosmetics with bee products! An apiary in a clean mountain area.

Website: https://ghoney.bg

The hive-based company products

- G-Power /powerful complex of bee superfoods/
- Handmade product. Each jar is a combination of propolis (natural immune support), royal jelly (food for the brain, energizing and full of protein bee pollen and raw honey.
- Face and body balm – 100% natural product, which contains a blend of vegetable oils mixed with pure propolis and beeswax from the GHoney bees.
- Pressed honey - extracted by using a cold pressing method of 100% bee honeycombs. This type of honey bears additional good qualities and benefits. It is called live honey as it contains more bee pollen than centrifuged honey. It also contains pieces of beeswax and bee bread, which make it a unique product! This method of extraction was used long time ago, before the centrifuge was invented. It takes more time and resources but the final product is worthwhile.
- Propolis tincture, which has bio stimulating and bioregulatory effects and can be used for a long time without any side effects



Api+Health

Description of best practices

It's a company run by a young person, who has managed to create a brand of bee superfoods and cosmetics, containing products from the hive. As part of its marketing strategy the company has developed additional products like shopping bags, branded wrapping and postcards, etc. in order to reach more customers.

The company is distinctive at the market by its limited quantity of cold-pressed honey, containing pieces of pollen and bee bread.

Innovation & SWOT analysis

Innovation:

- branded superfoods and cosmetics containing pure products from the hive

Strengths:

- Located in a fertile and clean area;
- Good quality control;
- Good marketing.

Opportunities:

- growing demand for healthy products and brands;

Threats:

- unfavourable economic situation.

Melissa Bee Farm

Various bee

It is a family business that is mainly engaged in beekeeping. For the family beekeeping is more an art than a business. They started with a few hives as a hobby, but the bees enchanted them so much and took over all their time, all their thoughts. They strive to keep healthy bee colonies without treating them with any medicines and without feeding them with any sugar. Their apiaries are surrounded with rich vegetation in the periods when the season is over in the other parts of the country. What they offer is entirely natural and pure.

The hive-based company products

- Immuno package - apistimulus, elderberry with honey, propolis tincture, nasal spray with propolis and silver water
- Royal jelly in honey - a mixture rich in amino acids, stimulates the growth of stem cells, supports the reproductive organs, improves collagen production in the skin, reduces cholesterol and improves metabolism, increases the body's resistance to viruses, normalizes blood pressure, stimulates the functions of endocrine glands.
- Apitonic - honey, royal jelly, bee pollen, propolis.
- Apistimulus - honey, royal jelly, propolis, bee pollen

Description of best practices

The priorities in the farm strategy are the technological innovations, introduction of new products, the ambition to offer the best quality and to maintain the already established customer trust. Melissa Bee Farm invests in training its staff in order to continuously improve their skills. Good beekeeping practices are welcome to the farm.

Innovation & SWOT analysis

Innovation:

- bio products are developed using modern technologies and investing in staff training

Strengths:

- variety of high quality products;
- fast delivery;
- good services;
- competitive prices.

Opportunities:

- growing demand for healthy products from local family-run businesses

Threats:

- infavourable economic or weather conditions;
- pollution.

Glossary

1

10-hydroxy-2-decenoic acid
The queen bee acid (10-hydroxy-2-decenoic acid) or 10-HDA is a bio-active compound found in royal jelly.

A

Adaptogen

(in herbal medicine) A natural substance considered to help the body adapt to stress.

Adverse Effect

In medicine it is an unwanted harmful effect resulting from a medicine or an intervention. It can be called a "side effect" generated by a doctor or treatment and is harmful to the patient.

Allergen

A substance that may induce a hypersensitivity reaction in susceptible persons who have previously been in contact with it. This reaction leads to the recognition of the allergen as a foreign and foreign substance.

Allergy

A damaging immune response by the body to a substance, especially a particular food, pollen, fur, or dust, to which it has become hypersensitive.

Alzheimer

A type of senile dementia, a neurodegenerative disease that manifests as cognitive impairment and behavioral disorders.

Amino acid

Amino acids occur naturally in plant and animal tissues and form the basic constituents of proteins. There are about twenty common amino acids.

Anaphylactic shock

A severe allergic reaction to an allergenic substance (a medicine, chemical compound, animal or plant venom, food, etc.).

Anti-exudative

Inhibits exudation, i.e. the oozing out of more or less fluid matter from small vessels and capillaries in inflammatory processes.

Apamin

Neurotoxin composed of an 18-amino acid peptide found in bee venom. Dry bee venom consists of 2-3% apamine, which selectively blocks channels in the central nervous system.

Arginine

One of the 20 amino acids that are part of the proteins.

Arthropathy

Degenerative joint disease causing loss of painful, thermal or proprioceptive sensation and progressing to arthritis.

B

Baklava

Traditional dessert made with crushed walnuts, filo dough and covered with syrup or honey. Accompanied by hot tea.

Balché

Water and honey-based drink to which they added pieces of bark from the Balché tree (Lonchocarpus longistylus), from which it receives its name.

Batiking

A method (originally used in Java) of producing coloured designs on textiles by dyeing them, having first applied wax to the parts to be left undyed.

Bee bread

Honey or pollen used as food by bees.

Bee venom

It is a cytotoxic and hemotoxic bitter colorless liquid containing proteins, which may produce local inflammation.

Breeding paste

Bird food supplement, especially in its development phase, contains minerals, proteins and vitamin supplements. There are dry, wet, vegetable, fruit or insectivorous breeding pastes.

Brood

Bee larvae

Browning

A process by which food becomes brown due to special chemical reactions.

Bursitis

Inflammation of the bursa, the pouch that protects and cushions bones and other parts of the body such as muscles, tendons, or skin. It is caused by overuse of a joint or injury. It usually occurs on the knees or elbows.

C

Candle

A cylinder or block of wax with a central wick which is lit to produce light as it burns.

Colitis

It is inflammation of the large intestine (colon) from infections or poisoning.

Contraindication

In therapy it is a prescription of a situation to be avoided, such as a physician or the administration of one or more medications or substances, which increases the risks of worsening the patient's symptoms.

Cookie sheet

A flat metal tray on which biscuits or cakes may be cooked.

Corrosion

The process of corroding [destroying or damaging (metal, stone, or other materials) slowly by chemical action.

Credit

The ability of a customer to obtain goods or services before payment, based on the trust that payment will be made in the future.

E

Edema

Accumulation of fluid in the extracellular or interstitial space.

Endothelium

The tissue which forms a single layer of cells lining various organs and cavities of the body, especially the blood vessels, heart, and lymphatic vessels.

Entrepreneur

A person who sets up a business or businesses, taking on financial risks in the hope of profit.

Environment

The surroundings or conditions in which a person, animal, or plant lives or operates.

Epithelial tissue

Called epithelium, is the tissue formed by one or several layers of cells joined together that cover all the free surfaces of the body and constitute the internal lining of cavities and organs, forming mucous membranes and glands.

Epithelialization

Natural healing action in which the epithelium grows on a wound. This is a membranous tissue composed of layers of cells that contain little intercellular substance.

F

Fertilization

The action or process of fertilizing an egg, female animal, or plant, involving the fusion of male and female gametes to form a zygote.

Finance

Monetary support for an enterprise.

Forklift

A vehicle with a pronged device in front for lifting and carrying heavy

loads.

Fungicide

A substance used to prevent the growth or eliminate fungi and moulds harmful to living organisms.

G

Gastritis

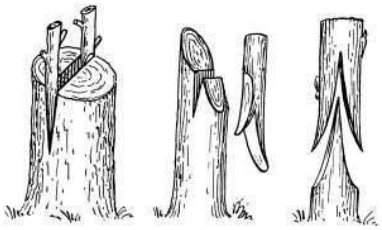
Inflammation of the gastric mucosa, which is the layer of cells that lines the stomach inside protecting it from the acidity of gastric juices.

Glycogen

Polysaccharide of energy reserve formed by glucose; it is not soluble in water. It is abundant in the liver and to a lesser extent in the muscle.

Graft

A shoot or twig inserted into a slit on the trunk or stem of a living plant, from which it receives sap.



H

Honeycomb

A structure of hexagonal cells of wax, made by bees to store honey and eggs.

Hydrogen Peroxide

A chemical compound with the formula H2O2. It is an oxidizing liquid whose domestic use is to disinfect wounds or as a bleach for clothing and hair.

Hydrolysis

The chemical breakdown of a compound due to reaction with water.

Hygroscopy

Ability of some substances to absorb moisture from the surrounding medium.

I

Immunomodulatory activity

The biological or pharmacological effects of compounds on humoral or cellular aspects of the immune response.

Income

Money received, especially on a regular basis, for work or through investments.

Inflammatory Bowel Disease in Dogs

A disease that affects the small and large intestine and causes chronic diarrhea, malnutrition, poor nutrient absorption and anemia.

Influenza

Or flu, is a contagious respiratory disease.

Infrastructure

The basic physical and organizational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise.

Input

What is put in, taken in, or operated on by any process or system.

Interest

Money paid regularly at a particular rate for the use of money lent, or for delaying the repayment of a debt

K

Knowledge

Facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject.

L

Literacy

The ability to read and write.

Lubricant

A substance used for lubricating an engine or component, such as oil or grease, to minimize friction and allow smooth movement.

Luminary

An artificial light.

Lyophilize

freeze-dry (a substance). Freeze drying, also known as lyophilisation or cryodesiccation, is a low temperature dehydration process.

M

Mead

Drink obtained from the fermentation of a mixture of water and honey, has between 10º and 15º degrees of alcohol and was the precursor of beer.

Melitin

Oligopeptide consisting of 26 amino acids and is the main active component of apitoxin, the venom of bees.

Mite

A minute arachnid which has four pairs of legs when adult, related to the ticks; many kinds live in the soil and a number are parasitic on plants or animals.

Moul

A furry growth of minute fungi occurring typically in moist warm conditions, especially on food or other organic matter.

N

Nectar

A sugary fluid secreted within flowers to encourage pollination by insects and other animals, collected by bees to make into honey.

Numeracy

The ability to understand and work with numbers.

O

Ointments

Are pharmaceutical forms due to the use of fats or substances of similar properties for the application of active ingredients in the skin. Its fundamental difference with creams is the absence of water in its composition

Organic

Produced or involving production without the use of chemical fertilizers, pesticides, or other artificial chemicals.

Osmolarity

It is the measure to express the total concentration of substances in solutions used in medicine. It indicates the osmotic pressure in the cells, which will occur when the solution is introduced into the body.

Output

The amount of something produced by a person, machine, or industry.

P

Parapharmacy

It is the practice of preparing and dispensing non-medicinal medicinal products. The latter are handled by the pharmacy.

Parkinson

A progressive disease of the nervous system that affects movement. Characterized by hand tremors, stiffness, and decreased movement.

Pestiño

Typical sweet Christmas of Andalusia and other Spain, made with flour dough, fried in olive oil and passed by honey.

Phospholipase

Enzyme catalysing the hydrolysis (chemical reaction) of the various components of phosphoglycerides (lipid molecules of the group of phospholipids).

Pollen

A fine powdery substance, typically yellow, consisting of microscopic grains discharged from the male part of a flower or from a male cone; each grain contains a male gamete that can fertilize the female ovule, to which pollen is transported by the wind, insects, or other animals.

Profit

A financial gain, especially the difference between the amount earned and the amount spent in buying, operating, or producing something.

Protein

Any of a class of nitrogenous organic compounds which have large molecules composed of one or more long chains of amino acids and are an essential part of all living organisms, especially as structural components of body tissues such as muscle, hair, etc., and as enzymes and antibodies.

Pungent

Having a sharply strong taste or smell

Q

Queen

A reproductive female in a colony of social ants, bees, wasps, or termites, frequently the only one present in a colony.

R

Rust

A reddish- or yellowish-brown flaking coating of iron oxide that is formed on iron or steel by oxidation, especially in the presence of moisture.

S

Skill

The ability to do something well; expertise.

Small-scale farmer

A farmer running a limited size or extent farm.

Swarming

Swarming is a honey bee colony's natural means of reproduction. In the process of swarming, a single colony splits into two or more distinct colonies.

T

Tailgate

A hinged flap at the back of a truck that can be lowered or removed when loading or unloading the vehicle.

Tendinitis

Inflammation of a tendon (the union of muscle with bone), which causes pain and problems in the mobility of the affected joint. The most frequent are elbow, heel, shoulder and wrist.

To add value

To add features to a basic [product] for which the buyer is prepared to pay extra.

Torrija

Slice of bread soaked in milk, syrup or wine, battered in egg and fried with oil. It is sweetened with honey or sugar.

Training

The action of teaching a person a particular skill or type of behaviour.

W

Waterproofing

Making impervious to water

Y

Yeast

A microscopic fungus consisting of single oval cells that reproduce by budding, and capable of converting sugar into alcohol and carbon dioxide.

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