Bee Economy

Introduction:

The bee, feared for its nasty sting, comes as an unwelcome visitor in our gardens and homes. People often scamper away when they see the buzzing insect approach their direction. Scary as the bee is, it brings a number of products enjoyed for their sweet natural taste, health benefits and other number of alternative uses. Beekeeping is the maintenance of honey bee colonies by humans commonly in hives for their honey and other product such as beeswax, pollen, propolis, venom , bee brood, bee bread , royal jelly etc. Bees offer numerous benefits for humans but for the purposes of this presentation, more light will be thrown on the following products from bees and their practical uses to humans.

Honey :

Production –

Commercial production of honey is done by two methods, namely indigenous method and modern method. To obtain pure and more amount of honey modern methods of apiculture are in practiced.

1. Old or indigenous method

This is primitive and unplanned method of apiculture. In this method two types of hives are used,

I. Natural fixed combs prepared by bees on the walls or the branches of trees

II. Artificial or man-made movable hives. These hives are made from wooden logs or earthen pots etc.

In the indigenous method, the bees are first killed or made to escape from the hive with the help of smoke when the bees are at

rest during night. This method has many drawbacks and it is not suitable for commercial large-scale production of honey. The following are the disadvantages of indigenous method:

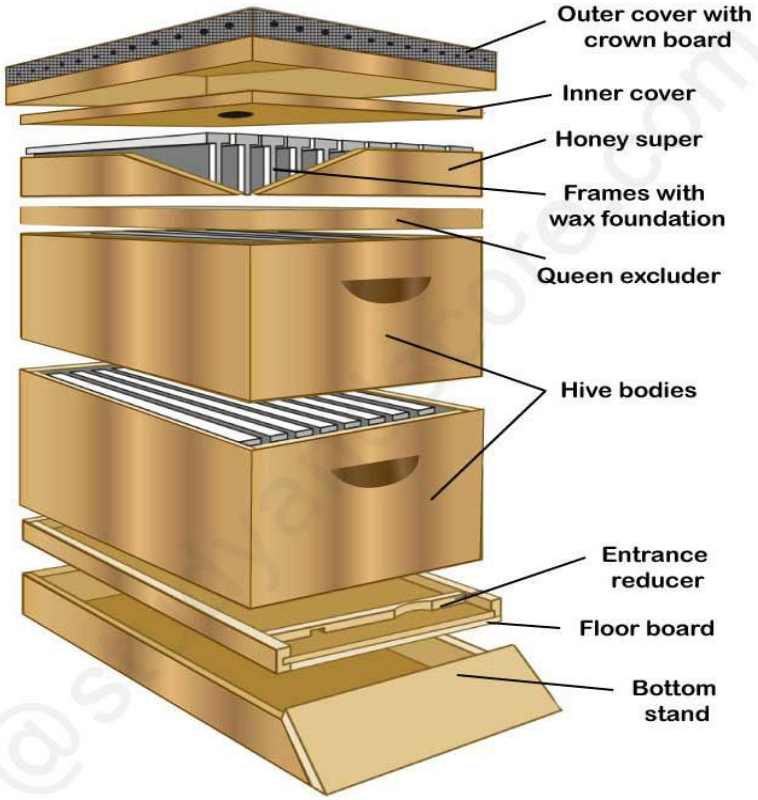
1. The honey cannot be extracted in the pure form. The extracted honey also contains the larvae, pupae and pollen cells.
2. The future yield of the honey is affected as the colony has to be destroyed to extract the honey. Moreover it takes lot of energy of the bees to build new hive.
3. The bees may not construct the new hive in the same place as the old one.
4. The natural hives also have the danger of attack by the enemies like rats, monkeys, ants etc. The natural hives can also be damaged by the climatic factors.
5. Also scientific intervention is difficult in the indigenous method and thus improving of the bee race is impossible.

Though the indigenous method has many drawbacks, it still persists.

2. Modern method

In the modern method of apiculture the honey bees are reared in movable artificial hives. This was designed and invented by Longstroth in 1951. This invention has turned apiculture into a cottage industry and has provided employment to lakhs of people.

The modern beehive is made up of a series of square boxes without tops or bottoms, set one above the other. These hives have a **floor board** and a **bottom stand** at the bottom and a **crown board** at the top. Inside these boxes, **frames** are vertically hung parallel to each other. The frames are filled with sheets of wax foundation on which the combs are built by the bees.



MODERN METHOD OF APICULTURE: MOVABLE ARTIFICIAL HIVE

The entrance of the hive can be reduced with the help of the **entrance reducer**. The queen is usually confined to the brood chamber. The boxes termed **honey supers** are used for storage of honey. The queen is prevented from going to honey supers by the **queen excluder** that allows only the workers to move.

The following are the steps included in apiculture or commercial production honey

Catching a swarm: Swarm is an old queen accompanied by huge population of workers flying to start a new hive. The swarm is generally collected with a straw basket called as skep with a lid.

Hiving a Swarm: It is the process in which the collected swarm is transferred to the hive to build up the colony and produce honey.

Initial feeding: After the hiving of the swarm, they are fed with sugar syrup. This feeding will help the bees to settle down to work in their new home.

Starting the work: After settling down in the new hive the bees start to work in their respective job roles in the new hive. The worker bees move about in the surrounding flora collecting nectar and pollen. Consequently the colony expands and starts the production.

Honey is the most important product of apiculture. It is a food material for bees and their larvae. The bee hive stores large quantities of honey to meet the demands in scarcity. Chemically, honey is a sticky water solution of sugar.

Composition of honey

- Water: 13-20%
- Fructose: 40-50%
- Glucose: 2-3%
- Minerals: Traces%
- Vitamins: B1, B2, C (minute quantities)

However, composition of honey and its different flavours depend on the kinds of flowers from which the nectar is collected. Nectar is sucked from flowers and mixed with saliva. It is swallowed into a special region of the gut called honey stomach.
Nectar is a disaccharide (sucrose) it is hydrolysed by the salivary amylase to produce monosaccharides (fructose and glucose). Inside the hive the workers regurgitate the processed nectar. The honey thus produced is still very dilute.
After placing this honey onto the storage cells of the hive the bees “fan” with their wings to evaporate the excess water and bring the honey to its required concentration. Extraction of honey from the combs is done by the method of centrifugation.

Uses of Honey:

Honey is a natural food made by the bee with nectar, pollen and other substances. It is considered natures most completely nourishing food as it contains nearly all nutrients required by humans. Proteins, free amino acids, vitamin B complex and folic acids are some of the major nutrients found in honey. Honey is a nutritious food, rich in energy and vitamins. Our body readily absorb sugar, minerals, vitamins and other materials from honey.

Some uses of honey are as follows –

- It is used as a carrier in ayurvedic and unani medicines.
- It acts as a laxative, antiseptic and sedative.
- It prevents cold, cough and fever.
- It is also used as a blood purifier.
- It is also used in religious ceremonies.
- It goes in the making of alcoholic drinks and beauty lotions.
- Another important use is in scientific research for making bacterial cultures.
- It is also utilised for making poison baits for certain insect pests.
- It is used as a carrier in ayurvedic and unani-medicines. It acts as a laxative and prevents cold, cough and fever.
- FOR MIOSTURIZING - Honey, when mixed with eggs and some flour, is an effective skin moisturizer. Best of all, it is gently formulated, so it can be used by people with sensitive skin. Mix four tablespoons of honey with a couple of egg whites and a few tablespoons of flour, depending on your desired consistency. Stir the mixture until it thickens. When the mixture is ready, you can use it as a hand and body lotion or a moisturizing face mask, eliminating the effects of dry skin.AS
- ANTISEPTIC - Honey happens to contain a good amount of Hydrogen peroxide . It only needs to be released by diluting the

substance in water or body fluids. When applied on an open wound, the glucose, contained by honey, is diluted and gradually releases hydrogen peroxide. The substance facilitates your wound's healing faster

- ENERGY BOOSTER - Mix honey with some water then drink the solution. Honey's glucose content will be absorbed by the brain and in the bloodstream, reducing fatigue in the process. You'll be healthy and quite happy just by consuming the simple solution
- Immune System Booster Though still not scientifically proven, the daily consumption of honey is said to strengthen your immune system. You can give it a shot, you've got nothing to lose anyway.
- Treatment for Sore Throat To create the sore throat- relieving serum, squeeze the juice from a lemon and mix it with some honey. Stir the mixture until both ingredients blend. Drink the solution. After a few moments, you will realize that your sore throat has been cured, or at least reduced. Just continue to make more rounds until you are finally free from colds.
- Other uses include - Colon Damage Prevention ; Parasite Remover ; Remedy for Burns ; Relaxant for Anxiety and Nervousness; Cancer and Heart Disease Prevention; Diabetic Ulcer Remedy

Bees Wax:

Beeswax is secreted by the wax glands located on the underside of the last four abdominal segments (4th to 7th) of the worker bee. This wax is used in constructing bee combs in which the colony of the bees develops. Bees need wax as construction material for their combs. They

produce it in their wax glands, which are fully developed in 12 to 18 days old workers. In older bees the wax glands diminish their activity. However in emergency situations wax-synthesis can be reactivated. Greatest quantities of wax are produced during the growth phase of bee colonies, under moderate climate conditions during April to June. A bibliography on the synthesis of beeswax is given in the monograph of Hepburn 15 . The main raw materials for wax formation are carbohydrates, i.e. the honey sugars fructose, glucose and sucrose 55. The ratio of sugar to wax can vary from 3 to 30:1, a ratio of around 20:1 being typical for central Europe 55. The stronger the colony, the smaller the ratio, the more economical the wax production for the colony. One Langstroth frame, containing only 100 g of wax can hold 2-4 kg of honey. Wax production and comb construction activity in the bee colony are determined by following factors:

• Nectar flow: the greater the flow, the more combs are needed for storage.

• Brood rearing (egg laying): the more eggs are layed, the more comb cells are needed.

• The presence of a queen: only colonies with a queen build combs.

• Temperature: temperatures higher than 15° C favour comb building activity

• The presence of pollen as a protein source

Production –

Industrial wax production began in the 19th century. In 1857 Mehring from Germany started industrial productions of comb foundations 11.The industrial production, is extensively described elsewhere 11. Here we will show the principles of smaller scale productions units, as

used in many European countries. World-wide, beeswax is produced mainly by specialized beeswax manufacturers. Beekeepers provide either old combs or crude wax. The good quality of beeswax depends greatly on the production methods. There are two wax extraction methods: melting and chemical extraction. Melting is the most frequently used procedure. Wax can be melted by boiling water, by steam, or by electrical or solar power. Chemical extraction by solvents is feasible only in a laboratory, where small scale wax production is needed. Good wax solvents are gasoline and xylene. The disadvantage of this method is that all organic wax contaminants and constituents of the pupae, propolis and pollen are dissolved. Thus the quality of wax can be impaired. This method is feasible only in a laboratory, where small scale wax production is needed. The wax recovery depends on the combs and on the method used. Generally, recovery from old combs are around 50 %. If more cappings and new combs are used it could be higher. The comb debris or comb cake left after separation of pure wax contains still some wax (about 30 %). This rest can be removed by solvents, but this wax will not have the best quality. According to Temnov49 beeswax in combs is in a free and bound state. When heating combs in sun melters and at temperatures below 100 oC only the free wax will be liberated. The bound wax can be liberated only by pressing or extracted by solvents. During the manufacturing of wax formation water emulsions can be often built. There are two emulsion types: in the first one water particles are dispersed into wax, in the second one wax particles are dispersed into water 43. These emulsions are built with the help of emulsifiers. Emulsifiers for the first type of emulsions are proteins and dextrines, contained in honey, pollen and salts of wax fatty acids with sodium and potassium. The second type of emulsion is caused

by the salts of wax fatty acids with calcium, copper and iron cations. Cations are contained in hard water, or diffuse out of the vessels, used for wax production. That is why soft water should be used, together with vessels from stainless steel. If emulsions are formed, they can be destroyed by letting wax for a longer time remain in the water bath at a temperature of 75-80°C. Wax, produced by the comb cappings has the best quality, as far as general quality criteria are concerned. However, this wax does not have less pesticide residues than normal beeswax.

Beekeepers can produce raw beeswax in a simple and cheap way. Combs are placed on the sun melter and are melted directly by the sun heat. The melter should be directly towards the sun 2-3 times a day. This method is efficient and the energy is “free of charge”. This method is preferable for the production of raw wax, as comb storage can avoided.

Manufacturing methods for beeswax -

• Hot water extraction using forced immersion The combs are placed in a tightly tied jute sack. Place sacks in a recipient with water and boil. As wax is lighter than water, it will filter through the jute and rise to the surface. After all combs have all melted, let the pot cool down. The wax solidifies as it cools, forming a block on the water surface. Throw out waste left in the sack.

• Extraction with boiling water and a wax press The combs placed into a 120 litre container with 20 to 30 litres of boiling water and left to melt. When all the wax has melted, remove the wiring and tip the contents into a jute-lined press, then start pressing.

• Combined steam and press extraction A metal basket of old combs is plunged into a tank of boiling water, closed with a watertight cover. A piston, capable of exerting up to 15 T of pressure presses the combs,

then tank is kept simmering for about one hour. Wax runs to the top of the tank.

• Steam extraction Combs with frames are placed into a container where vapour is introduced. The trester is sieved, wax flows into the lower part of the container and can be collected. There are different commercial devices

• Centrifugal extraction Combs are meted in boiling water and boiling mixture is poured into baskets of a centrifugal wax extractor, spinning at more than 1500 rpm, kept at temperatures over 65°C to prevent the wax from setting. Pure wax runs out of through an opening from the extractor. Method used for bigger manufacturing units, due to expensive installation.

• Heat extraction with electric elements Press combs or frames between two electrically heated metal plates. Plates are pushed together, the wax melting into a recipient

PROPERTIES AND COMPOSITION –

Beeswaxes from different honeybees Publications on the physical constants for the comb waxes of Asian and European beeswaxes first appeared a century ago. It was soon shown that carbon chain length was,

on average, shorter in the Asian beeswaxes than in A. mellifera, which explains the lower melting points of the former. The Asian waxes are more similar to one another than to A. mellifera. In Asian beeswaxes, the amounts of C31 and C33 in the pool of free fatty acids are reduced, but C25 hydrocarbons are increased compared to that of A. mellifera. The major compound families in beeswax are alkanes, alkenes, free fatty acids, monoesters, diesters and hydroxymonoesters, while fatty alcohols and hydroxydiesters are minor constituents. There are notable species-specific differences in the beeswaxes among honeybee species, but all share a complex mixture of homologous neutral lipids16 The wax produced by different species of Apis mellifera, and also of African adansoni wax, have the same composition but some components are in a different proportion. The waxes of Asian bees Apis florae, Apis dorsata and Apis cerana, are called Ghedda. The composition of wax from Asian honeybee species is much simpler and contains fewer compounds in different proportions . The different Ghedda waxes resemble each other much more, than any of them to the Mellifera waxes. Thus, Ghedda waxes cannot be used as substitutes for Apis mellifera wax. Ghedda waxes from the Asian honeybee species are described as softer and more plastic, but do not have a significantly different melting point.
The beeswax composition seems to vary also within the bee hive. There are different subtypes of beeswaxes in the bee colony serving as cues for bees to recognise bases, sexes and comb age.

Uses –

- Postharvest treatment of fruits and vegetables Beeswax are used as glazing agent on fruits and vegetables to prevent moisture lose and pathogen attacks eg tomato and cucumber • Surgical bone wax

- It is used in preparing surgical bone wax which is used in controlling bleeding from bone surface.
- Polishing furniture Beeswax are dissolved in turpentine for polishing furniture
- Making of traditional candles.
- Making pharmaceutical preparations like ointments.
- It is also used in the manufacture of cosmetics like face creams.
- Carbon papers are also mad with the help of bee wax.
- In laboratories it is used in microtomy work to prepare blood tissues.
- Preparation of varnishes and paints
- Water proofing and waxing of threads; and
- Formation of comb foundation (wax foundation in apiaries).
- Cosmetic and skin care products such as Moisturizers Lip gloss Lip balm Eye shadows Eye liner Moustaches wax Hair pomade which makes the hair sleek
- Other uses include, the making of Candles, tooth paste, crayon, Water prove leather, dental floss.
- Bees |wax for health benefits - Besides being another replacement for chewing gum, beeswax has some positive health benefits. Some studies show that ingesting beeswax, and some other plant waxes, lowers cholesterol in humans. The wax esters or aliphatic acids and alcohols found in beeswax lower low-density lipoprotein (bad cholesterol) and raise high density lipoprotein (good cholesterol). The challenge with these studies is that they are hard to reproduce in multiple geo locations around the world because bees have access to different foods and densities of nutrients. But scientists are working towards building honey bee nutrition to bring consistency to these studies.

- Beyond cholesterol, beeswax has shown evidence of increasing liver health in the body. One study executed by the Korean Journal of Internal Medicine evaluated the effectiveness of some compounds found in beeswax to improve the regular liver function in humans with fatty liver disease.

Propolis –

The term propolis, (aka bee glue) originated with the Greeks who often observed a sticky resinous substance around the entrance to their hives. In Greek, "Pro" means coming before or in front of, and "Polis" is the Greek word for city or a body of citizens. Thus, propolis is what one could expect to find at the entrance to the city of the bees. Today beekeepers will often observe that the bees will use propolis to restrict or narrow the entrance to the hive to make it easier to defend. Honey bees use propolis as both a building material and as a way to sterilize and disinfect the cavity that contains the colony. This is because, as we will explore in this two part series, propolis is among the most powerful antimicrobial substances found in nature.

Honey bees make propolis out of the resins they collect from deciduous trees such as cottonwood, birch, alder and poplar (aspen). As these trees bud, they exude these resins around the bud in order to protect is from fungi and other diseses. Foraging bees utilize their pollen baskets (corbicula) to carry globs of propolis resins back to the hive. Unlike with pollen however, foragers require the help of other bees within the colony to help them remove the sticky resins from their hind legs so it may be used by the colony.

Composition

Over 240 compounds have been reported to have been extracted from honey bee propolis. While the composition of propolis will differ somewhat depending on which trees the bees gather the resins from, the typical composition tends to be approximately 45-55% resins, 25-35% waxes and fatty acids, 10% essential oils and aromatic compounds (phenolics), which includes vanillin and gives propolis the wonderful vanilla-like smell, and 5% pollen. An additional 5% or so of the constituents of propolis are other organic compounds such as flavonoids (or bioflavonoids collectively known as Vitamin P and citrin). There are even minor components of propolis that researchers have, to date, been unable to identify at all. When warm, propolis is as sticky as chewing gum, but it becomes hard and brittle when cold.

Production

Research indicates that conditions which stimulate the collection of propolis by a colony of bees include: rough surfaces within the hive, cracks and crevices within the hive that are smaller than the 5/16th of an inch bee space and not suitable for building comb, drafts and light coming into the hive in unwanted places, and disease infections.

Beekeeping supply companies often sell traps that can be used to collect propolis. The trap consists of a thin plastic sheet that has narrow slits cut into it and replaces the inner cover on the hive. Over time bees will fill the narrow slits in the plastic when the outer cover is flat on the hive, however, leaving the outer cover propped up to allow light and air in through the top of the hive will encourage the bees to plug up the holes in the propolis trap faster.

Once the trap is plugged up with propolis it is put in a bag and placed in a freezer for at least a few hours. Immediately upon removal from the freezer the trap (still inside the bag) is banged against a hard surface such as a table top, or simply contorted and gently bent back and forth in order to cause the brittle propolis to crack, break and fall from the trap.

Propolis can be collected by catching the hive scrapings when cleaning out the honey supers during the honey harvest as well. Unlike propolis collected from a trap, hive scrapings will tend to contain contaminants such as bits of wax, wood, dead bees, etc. One way these contaminants can be removed from the propolis by soaking the scrapings in a pail of water. Dead bees, pieces of wood and bees wax will tend to float while the propolis will tend to sink, allowing the beekeeper to separate out the majority of contaminants.

Another way to clean propolis hive scrapings is to place the propolis scrapings into an oven-proof container. The scrapings are covered with two to three inches of water and placed in an oven at 200°F. The contents of the container should be baked for at least two hours and stirred often in order to release any wax that may be trapped within the mass of propolis. The melted wax, pieces of wood, etc., will float to the surface of the water while the propolis will stick to the bottom of the container. After the container is removed from the oven and cooled, the waxy layer on the surface of the water can be removed and the water carefully poured off to reveal the colored propolis mass beneath it. The container of propolis can then be frozen and when the propolis is brittle, it can be chipped out of the container. The cleaned propolis pieces

should be spread out on a sheet of paper or cardboard to dry before placing then into storage.

As noted, honey bees use propolis as an extension of their immune system and rely upon it to keep healthy. I believe this is one of the primary reasons that when the genome mapping of the honey bee was conducted, it was found that bees have far fewer genes dedicated to immune response than any of the other insects that had also undergone genome mapping. The utilization of propolis by the colony appears to have eliminated the need for bees to invest biological energy in the development of a more robust immune system within the body of each bee. As a result, I don't like to take propolis from my hives since doing so may decrease the overall health and vitality of the bees. However as we shall see, the profound health benefits that propolis can provide for humans compels me to collect propolis, but typically only from the honey supers that are being harvested in the honey house. Additionally, since I don't want to do the extra work of cleaning it, I only collect and put aside chunks of pure propolis rather than try to capture all the propolis in the scrapings, etc. As a result, the amount of propolis I produce annually is rather small and results in only two-to-three dozen bottles of propolis alcohol tincture.

Uses –

- **Diabetes.** Research shows that taking propolis may improve blood sugar control by a small amount in people with diabetes. But it doesn't seem to affect insulin levels or improve insulin resistance.
- **Cold sores (herpes labialis).** Most research shows that applying an ointment or cream containing 0.5% to 3% propolis five times daily helps cold sores to heal faster and reduces pain.
- **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.

Pollen –

Pollen that is collected by honey bees is referred to as bee pollen. The grains of pollen that make up bee pollen are the tiny, male reproductive units (gametophytes) that form in the anthers of flowering plants. The majority of plants on the planet today require that their pollen be transferred onto the receptive stigma of flowers (pollination) by wind, water, birds, bats, butterflies, beetles or bees, the most important species. The characteristics of bee pollen will depend upon the plants from which it is gathered. Some honey bee foragers collect only nectar, some both nectar and pollen, and some only pollen. But flower fidelity, visiting only a single species of flower in one trip means the pollen pellets (one on each leg) will tend to be all from the same type of plant and uniform in color and can range from white to black. While pollen provides almost all the bees proteins and nutrients, there is no single type of plant that produces bee pollen that will have all the vitamins, minerals, fats and proteins in exactly the right ratios for optimum honey bee health. (Di Pasquale, 2013) Bee pollen is also the nutritional and mineral source for the production of royal jelly by worker bees. As a result, a bee colony will tend to forage on a variety of pollen sources and bee pollen will tend to be a mixture of pollen from all the different species of plants that the colony's foragers are able to visit.

As bees fly through the air, they build up a positive static-electric charge on their body. This helps them to collect the pollen dust from the flowers they visit since the negatively charged pollen will be attracted to, and stick to, the bee's body in much the same way that a balloon rubbed against a wool sweater will stick to the wall. Once the bee's body is covered with fine pollen grains, the bees will use stiff hair-like structures on her legs to groom themselves and "comb" all the pollen off their body. Some honey or nectar is regurgitated from the honey stomach and mixed with the pollen grains in order to help them stick together. Special hair-like structures which are situated on the tibia on the bee's hind legs and nicknamed the pollen baskets (corbicula) are used to pack the pollen

into small pellets to be transported back to the hive where it is used primarily for feeding and raising the young. This is why most pollen in a hive is typically found stored in and around the brood nest.

Fresh pollen is high in moisture and protein and, especially when brought into the hive – which stays around an internal temperature of 95˚F (35˚C) – it enters an ideal environment for mold growth. When the pollen is not consumed fresh, honey bees ferment the pollen through the process of making bee bread. To make bee bread, worker bees fill approximately three-quarters of a honey comb cell with pollen and then fill the remaining quarter of the cell with honey. The cell is then capped with wax. This helps preserve the pollen for future use (Anderson 2014) and it is theorized that it has the potential to make some nutrients more accessible for honey bee nutrition, although the science establishing this is weak.

Lactic acid bacteria (LAB) (Vásquez and Olofsson 2009), are the primary bacteria which come to dominate the pollen substrate when it is packed together and sealed from the air with honey. The bacteria metabolize sugars in the pollen, producing lactic acid and lowering the pH from 4.8 to around 4.1 (Mattila et al. 2012) – well below the generally recognized threshold for pathogenic microbial growth of 4.6. Some of these LAB come from the bees themselves, (Gilliam 1979a; Gilliam 1979b), but most of the beneficial bacteria apparently come from the flowers bees visit. (Anderson 2014) While the difference in microbial ecology of fresh pollen compared to stored pollen can be significant (Gilliam et al. 1989), it appears that despite what is commonly believed, the fermentation of pollen into bee bread is primarily a food storage activity rather than an activity aimed at improving the nutritional value of pollen (Herbert 1978). This theory is also supported by research into the beebread of stingless bees that found pollen storage appears to be of little importance in changing its nutritive value. (Fernandes-Da-Silva 2000)

Collection

Bee pollen is collected by beekeepers with the use of pollen traps, devices that fit over the entrance to a hive and contain openings just big enough for a returning forager to squeeze through. In the process of squeezing through the opening in the trap, the pollen carried on the hind legs of the bee are knocked off and falls through a screen into a drawer where it is collected by the beekeeper. There are many pollen trap designs available and in use. No matter what type of trap is used, it is important that all other entrances to the hive be closed off or returning foragers will quickly learn to enter from them in order to retain their pollen loads. I have also observed colonies that modify their foraging behavior and return with smaller pollen loads that are able to fit through the narrow opening of the pollen trap without being knocked off the hind legs of the returning bee.

Due to the highly perishable nature of fresh bee pollen, the pollen collected in a trap needs to be collected daily and immediately preserved in some way to retard mold growth and maintain the pollen's nutritional and medicinal properties. This makes pollen production very labor intensive, and as a result the majority of pollen available tends to come from other countries that have lower labor costs.

Trapping pollen has the potential to inflict significant nutritional stress on the colony. Some traps are best only applied to a hive for a short period of time, providing a small amount of pollen for the beekeeper. Such traps may also be applied for a few days and then removed for a period of time, before being reapplied so that the colony is able to obtain a reasonable inventory of pollen for its dietary needs. Some pollen trap designs even advertise that they only trap a certain percentage of pollen from a hive, therefore allowing the trap to be left on the hive continuously, hopefully without causing undue stress and a reduction in the colony's population growth too severely. Colonies with traps usually quickly change the atio of pollen:nectar collectors to compensate for reduced pollen collection. Depending ont he efficiency of the trap, many nectar collectors may be recruited, reducing a potential honey crop.

Uses –

Bee pollen is a natural mixture of flower pollen, nectar, bee secretions, enzymes, honey and wax used as a nutritional supplement. Natural health practitioners promote it as a superfood due to its nutrient-rich profile that includes tocopherol, niacin, thiamine, biotin, folic acid, polyphenols, carotenoid pigments, phytosterols, enzymes, and co-enzymes.

It's widely available in dietary supplement form used for the following health conditions:

- acne
- allergies
- arthritis
- asthma
- eczema
- high cholesterol
- osteoporosis

In addition, bee pollen is said to enhance energy, sharpen memory, slow the aging process, promote weight loss, and improve athletic performance.

To date, scientific support for the health effects of bee pollen is fairly limited. However, there's some evidence that bee pollen may offer

certain benefits. Here's a look at several key findings from the available studies:

Allergies

One of the most common uses for bee pollen is the management of seasonal allergies, such as hay fever. It's thought that ingesting pollens will help the body to build resistance to these potential allergens and, in turn, reduce allergy symptoms.

Although very few studies have tested the use of bee pollen as a remedy for seasonal allergies, some animal-based research indicates that bee pollen may provide anti-allergy effects.

A 2008 mice study published in the *Journal of Medicinal Food* showed bee pollen may inhibit activity in mast cells, a class of cells involved in releasing histamine in response to allergens and, as a result, triggering the symptoms associated with allergies.

While bee pollen shows promise for treating seasonal allergies, there is a lack of human studies to confirm its use as an allergy treatment.

Cholesterol

Bee pollen may help to lower high cholesterol. Two animal studies one published in the journal *Nutrients* in 2017 and another published in the journal *Molecules* in 2018 found bee pollen lowers LDL and total cholesterol levels.

However, research in humans is needed to confirm these results before bee pollen can be recommended for lowering cholesterol.

Liver Health

Several animal studies show bee pollen hay help protect the liver against damage and may even help repair liver damage from alcoholism and drug use.

A 2013 study published in *Evidence-Based Complementary and Alternative Medicine* found bee pollen promotes healing in liver cells and protects against damage with fewer side effects than milk thistle.

Osteoporosis

Bee pollen shows promise in the treatment of osteoporosis, suggests an animal-based study published in 2012.

In tests on rats, the study's authors determined that bee pollen may help boost bone levels of calcium and phosphate and protect against osteoporosis-related bone loss.