



Ministry of Agriculture and Livestock Development  
State Department for Crop Development  
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Emergency Locust Response Program  
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## Sustainable Agricultural Livelihood Restoration, Rehabilitation and Resilience in Kenya Training Manual

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### 3.1.6 SUB-MODULE 6: HIVE PRODUCTS

#### Introduction

Hive products are all products derived from the hive as a result of honeybee activities. The following are the main hive products: - 1) Honey 2) Propolis 3) Pollen 4) Bee venom 5) Beeswax 6) Royal jelly

#### Honey

Perhaps the most widely used hive product. Honey is presented in the market in different forms namely:

**Unprocessed honey:** this is honey that has just been harvested awaiting to be processed.

**Semi-refined honey:** this is honey where big comb particles have been manually removed.

**Chunk honey:** this has a piece of comb honey immersed in refined honey. It is not common in the market.

**Creamed honey:** this is honey that has been allowed to crystallise under specific conditions. The crystals are fine and not visible and therefore it can be spread like butter on bread.

#### Physical properties of honey

**Colour:** ranges from light amber, amber, and dark amber, dark to light yellow or white depending on the source of nectar. Colour is measured by means of the permanent glass colour standards or the PFund Colour Grader.

**Hygroscopicity:** Honey is remarkably hygroscopic (the ability of a substance to absorb moisture from the air).

**Viscosity:** The ability of a substance to resist flow. Honey is highly viscous.

**Thixotropy:** Honey is relatively thixotropic; it has a tendency to form a gel due to large amounts of certain proteins e.g. Heather honey.

**Thermal Conductivity:** Honey is a bad conductor of heat.

**Density:** 1.39-1.4 g per cm<sup>3</sup> at 20 °C.

**Aroma and flavour:** Honey has a sweet aroma and taste.

#### Chemical composition

Honey consists mainly of sugars, with the simple sugars (fructose and glucose) being dominant. The complex sugars (sucrose, maltose, lactose) occur in small quantities. Other components include water, vitamins, minerals, proteins, acids and enzymes.

**Honey Crystallisation/Granulation** It is normal for honey to crystallize or granulate naturally upon storage. Crystallization of honey is affected by the following factors - temperature, presence of foreign matter and the equilibrium between glucose and fructose sugars present in honey. In an ideal situation, the invert sugars in honey plays a major role in that the equilibrium shifts from glucose to fructose, which is more stable. For this reason, crystallized honey has more of glucose than fructose. For good quality honey, crystallization usually begins at the bottom of the container going upwards until the whole mass turns into one continuous solid. The type of crystallization in honey should as much as possible be uniform irrespective of the size of the crystals formed.



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### *Uses of honey*

**Honey as Food:** A major part of honey produced is eaten as Table Honey. Of the estimated annual world consumption of honey, 90% is eaten directly either as liquid honey, comb honey or chunk honey. It is also used as a sweetener in beverages, bread and cakes. The use of honey in baking improves moisture retention and thus increases storage life and provides a richer flavour. Honey in confectionery is also used in preparation of sweets. However, sweetening agents like sugars or syrups tend to replace honey because they are cheap. Honey has also been used to make honey mead which is a popular alcoholic beverage in many African communities.

**In Medicine:** Honey is a component of many commercially manufactured pharmaceutical products such as cough syrups. It is also used as a palatable sweetening agent in general pharmaceuticals.

**In Cosmetics:** Honey is valued in cosmetics due to its moisturising effect on the skin thus, it is incorporated in the manufacture of various cosmetic products like soaps, creams, shampoos and conditioners.

**Honey as a Preservative:** The use of honey as a preservative is very common with the older generation. Traditionally honey was used as a meat preservative. The high sugar concentration combined with antibacterial nature of honey makes it an effective preservative

### *Propolis*

Propolis is a sticky, gummy, resinous substance gathered by honeybees from the buds and bark of plants and trees. The bees use it for sealing, strengthening, lining and preserving material inside the hive and around it.

**Physical Properties:** Colour: ranges from yellowish green, reddish to dark brown. Taste: It is bitter in taste.

**Chemical Composition:** Composition varies from sample to sample depending on the source. Propolis comprises 50-55% resin, 10-15% volatile/essential oils, 30% beeswax and 5% pollen. Propolis also contains minerals, amino acids and bioflavonoids (biochemicals responsible for the healing process). Bioflavonoid is said to stimulate the white blood cells or lymphocytes, to produce interferon whose role is enhancing the body's resistance to virus infections.

### *Propolis utilisation*

- Propolis can be used as a safe non-toxic food supplement.
- It can be used to make grafting wax used by gardeners and crop growers to seal the union of plant tissue
- Main uses of propolis are on natural food supplements and herbal medicine.
- Ancient Egyptians used propolis for mummifying their dead kings and queens.
- Propolis is used in veterinary practice in ointment for treating cuts, abscesses and wounds of animals
- It is also used for treating burns, external ulcers and eczema in humans.

### *Pollen*

Pollen is the male germ plasma of plants. It is the main source of proteins, fats and minerals in the honeybee diet.

**Physical Properties:** The colour ranges from yellow, red to orange. It appears as fine grains/granules.

**Chemical Composition:** Pollen comprises of 20-25% protein, 27% carbohydrates mostly simple sugars (fructose and glucose), vitamins, free amino acids, lipids, enzymes and co-enzymes, pigments: xanthophylls and carotene, water and minerals (potassium, calcium, iron etc).

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### *Pollen utilisation*

- Human beings use pollen as a food supplement because it is believed to boost the immune system
- Build strength.
- Stamina and vitality.
- It is also used in creams to rejuvenate and soothe skin
- Pollen is used to rear insects and feed birds
- It can be used as feedback to colonies during pollen- deficient nectar flows or to queen cell builders.

### *Bee venom*

Bee venom (apitoxin) is the poison ejected from the poison sac of the bee sting when a bee stings. It is synthesised by the venom glands of worker and queen bees.

Physical Properties. It is a clear liquid with a sharp bitter taste and aromatic odour.

Chemical Composition. Bee venom contains about 40% dry substance and hardens fast when in contact with the air. It contains water, peptides (mellitin – 50%, hyper and MCD (Mast cell degranulating peptides) apamine, histamine, dopamine and minimine.

Phospholipases A splits lecithin - a phospholipids which is widely spread in the body, turning it into lysolecithin which degenerates cell membranes. Hyaluronidase splits the hyaluronic acid – a constituent element of the fundamental substance of the conjunctive tissue, thereby favouring the spread of the active factors of the bee venom throughout the body. Its specific gravity is 1.313 and pH = 4.5. Bee venom is destroyed by digesting and oxidising enzymes, and is readily soluble in water and acids but is insoluble in alcohol.

### *Beeswax*

Beeswax is obtained from wax cappings or empty combs. It is a very valuable product with beekeepers earning up to 5% of their income from wax production. Currently prices of beeswax are on a downward trend due to competition from petroleum-based waxes. At present the cosmetic industry is the biggest user of this hive product followed by the beekeeping industry for the manufacture of comb foundation sheets.

Preparation of Beeswax for Market Before beeswax is placed on the shelf for the purpose of selling, it must be prepared well having the following in mind. Beeswax should be free from organic matters such as bees, brood, debris, sand or any other undesirable materials. It should not be adulterated by blending it with other types of waxes such as parafin wax, synthetic wax or any types of oil or fat (animal or vegetable). NB: The colour of beeswax varies from whitish yellow to yellowish brown. This will depend on the type of combs one uses when making the beeswax.



Bees wax cakes



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### ***Royal jelly***

Royal jelly is a honey bee secretion that is used in the nutrition of larvae and adult queens. It is secreted from the glands in the hypopharynx of nurse bees, and fed to all larvae in the colony, regardless of sex or caste.



Developing queen larvae surrounded by royal jelly

### ***Royal Jelly utilisation***

The main use is in the cosmetics industry as a moisturising agent in health and beauty products such as body creams. Added to a variety of other cosmetic products royal jelly's antibacterial, cleansing and textural properties account for its cosmetic popularity. Royal jelly is nutritious and is used as a health food and is often added as a supplement to other ingredients and vitamins which are taken as either capsules or as part of a beverage in confectioneries or mixed with honey as a spread. It also boosts the immune system, strengthens nails, improves skin and hair. Royal jelly is also used by beekeepers to prime queen cells before grafting.