HONEYBEE:
PRODUCTS AND THEIR USAGE

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INTRODUCTION:

Honey bees are social and hardworking insects producing various bee products – honey, bee wax, pollen, royal jelly, propolis, bee venom and providing pollination service to plants. Honey, without any doubt is well known economical hive product. But along with it, honey bees also produce number of products which owes medical and nutritionally rich composition. *Apis mellifera*, a honey bee species which can be domesticated in Langstroth hives is becoming popular day by day among the farmers and they are adopting it as a side business along farming. Therefore, it is necessary for them to know about the importance of the products which can be obtained from the hive and how these can be harvested for their own usage. Apart from this, bees do pollination of the plants which is helpful in fruit setting and increasing the yield to multiple folds.

HONEY

Honey is nature's one of the best gift to the mankind. It has been present since long time but a very little is known about it. Honey is mass-produced by honey bees by collecting nectar from the blooms and regurgitating it in the comb's cells after enriching with several nutritional components. Honey Bees collect Nectar from flowers as energy source for hive activities and as protein source for growth. Nectar is converted into honey by enzymatic inversion of nectar sugars (sucrose) into honey sugars (glucose + fructose). Honey is primarily composed of water and carbohydrates. It also contains several minerals and vitamins. Honey is basically sweet due to presence of dominant monosaccharides glucose 32-38% and fructose 35-40%. Water content is about 18–25%, acids, minerals, proteins, vitamin etc. 0.1-0.2%.

BEE WAX

The basic necessity for the construction of combs is bee wax. Honey bees produce it from the wax glands. They are present in the ventral side of 4th, 5th, 6th and 7th abdominal segments. The liquid secretions of the glands solidify immediately to fine white scales when come in contact with air. Later on, these scales were taken by the hind legs and handled by mouth parts. These glands are fully developed in 12 to 15 days in workers bees and stops secreting the wax in the foraging/ older bees. The rate of production was increased during the growth phase of the colony during March and April. Freshly produced wax is whitish in color which later on turns into light yellow (Fig.1). However, depending on the flora which is consumed by the honey bees wax color can vary. Bee wax is a complex material majorly contains hydrocarbons (14%), monoesters (35%), tri-esters (14%), Hydroxy polyesters (8%), free carbonic acid (12%) and some minor components. The melting point of the wax vary between 61°-65° C. One kilogram of bee wax can be obtained from individual hive during the one year. Old combs, combs after honey extractions, honey cell cappings and broken combs can be melted and can be reused for making the comb sheets using various equipments. Bee wax is commercially used in candle making, shoe polishing, floor washing, carbon paper, electricity material, cloth making, statue construction, gums, and different wax colours for children etc.

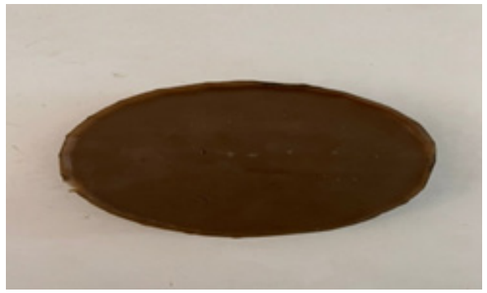

Fig.1. Bee wax produced by honey bees

POLLEN

Pollens are obtained from the plant anthers collected by the foraging bees and placed it in the pollen basket located on the tibia of hind legs. Bees damped the collected pollen after mixing with saliva in the comb cells. It is a raw material for bee bread preparation which is fed to the bee colony members. It constitutes the basic source for proteins and carbohydrates. It contains approximately 20% protein, 8% fiber, 4% minerals 4%, 3% fat 3%. The shape, size, color and weight of the pollen depend upon the plant species from which it is collected. It can be collected by installing pollen trap in front of the hive (Fig.2). Foraging bees when enter the hive through the trap, pollen gets unloaded in the tray which can be later on collected and preserved in refrigerators after drying in shade. It can also be given to the bees as a diet during the dearth period. A ten frame colony can produced approximately 250 grams of pollen in 15 days. Nowadays, the gym instructors were advising the trainees to taken pollen as a diet supplement for muscle build up. Also, Pollen capsules are available for consumption. It also offers potential medical applications by demonstrating series of actions such as antiviral, antifungal and anti-inflammatory.

Fig.2. Pollen trap placed for pollen collection

PROPOLIS

Honey bees collect exudates from bark, buds or leaves and produce a natural resinous mixture called as propolis. It is used by the honey bees for the sealing the cracks and crevices and for smoothing the inner walls of the comb. Its composition consists of resins (55%), waxes (30%), essential oils (10%) and pollen (5 %). It has lipophilic nature and hard but at higher temperatures it becomes soft, sticky and gummy substance. Propolis can be collected from the hive by scratching with knife or by using propolis collection sheet by placing over the combs. When bees fill the gaps of the sheet when propolis, then these sheets can be removed and placed in refrigerators for further processing. Currently, propolis can be used for antimicrobial applications, treatment of burns, acnes. It has also been used for the preparation of in oral medicines, colour and varnishes and cosmetics.

ROYAL JELLY

Royal jelly is a milky substance secreted by hypopharyngeal glands of young worker bees to nurture the queen bees and as well as worker bees. Worker bees of 6- 13 days old start producing the royal jelly to feed 1- 3 days old larvae. It is soluble in water and and a rich source of proteins. The composition of royal jelly consists of 17-45% protein, 18-52% sugars, 3.5-19% fats and 2-3% minerals. It can be collected by grafting the 1-2 days old larvae in the queen cell cups. Nurse bees will fed the queen larvae with royal jelly and fill the queen cell with excess of it. After 3-4 days when the queen cell cups are filled with royal jelly, remove the larvae and collect the royal jelly with royal jelly extractor. 300 grams of royal jelly can be obtained from the 1000 queen cell. After collection, it should be stored at very 0-5° C temperature. Nowadays, royal jelly is sold on health food stores as the customers connected to its mystery properties for healthy skin, long and healthy life. Premature babies are fed with it in order to increase their weight, appetite and blood.

BEE VENOM

Bee venom is produced by the worker bee from the venom gland present on the posterior side of the abdomen. It is colorless and odorless liquid containing a mixture of proteins and having acidic pH. The chemical composition of bee venom contains 66.5-74% protein, 11-15% enzymes, 1.5% amino acids, 2% sugars, 5% fats and 4.8% volatile compounds. It can be extracted by using bee venom extractor by placing it in front of the hive and giving the very low voltage electric shock (Fig.3). 1 gram of bee venom can be collected from 20 colonies. It should be stored in refrigerators in opaque material. It can be used to treat arthritis and is available in the form of capsules, tablets or injections.

Fig.3. Bee venom extractor used for the extraction of bee venom

POLLINATION SERVICES

Pollination is a crucial ecological process for preserving the diversity of an ecosystem. It is an important ecological mutual association; honey bee rewarded by flowers with nectar and pollen and ultimately receives the advantage of pollination for completing the reproductive cycle by transferring pollen from anther to stigma of same species (Fig.4). Human survival also depends more directly on the interaction between the plants and the pollinators because crops of agricultural importance rely to a variable extent for the setting of seeds for sowing or breeding and development of fruits. It is estimated that one third of human diet i.e. every third bite is comprised of those crops which rely on insects for meeting their pollination requirement. Therefore, at commercial level apiculturists can hire their colonies to the farmers for the pollination service in their farms on rent basis and can earn double income. This practise is adopted in foreign land in many fruit orchards.

Fig.4: Pollination performed by honey bees

APITHERAPY

Apitherapy is the use of bee stings to treat specific chronic inflammatory disorders including rheumatism neurologic disorders, vascular disorders, gastrointestinal disorders, or allergic disorders. The treatment regimen consisted of live bee stings once daily or three times a week applied to the spine, presumably correlating with the involved joint or along acupuncture “trigger” points. Pressure was then applied by the thumb to the point of pain. After the first weeks of treatment, some patients experienced exacerbation of their disease in a so-called reactive stage, considered as essential and reflecting activation of the immune system. When a specific (unidentified) level of resistance is reached, therapy is commonly stopped.

CONCLUSION:

Honey bees play an important role through several ways. It provides a variety of products which can be utilized in different ways. Its major product i.e. honey is irreplaceable as almost everyone consumes it in any form. Several other products such as bee venom, wax, pollens, propolis and royal jelly are utilized in different ways. They are the only creatures which stand between humans and starvation. So, more efforts can be directed towards the development and utilization of different honey bee products.