



# Beekeeping opportunity for the smallholders in the cold winter deserts of Uzbekistan

## 1. BEEKEEPING

Beekeeping (or apiculture) refers to raising the colonies of honey in hives. Honey, wax, pollen, propolis, bee milk and poisons are the most valuable foods and unique raw materials for human health, medicine and the pharmaceutical industry. Another important function of beekeeping is to assist in the pollination of cross-pollinated crops. Bees are also raised for selling to individuals interested in beekeeping. Beehives are kept in a specific location rich in flowering plants, such a place is called a bee yard (Figure 1). Approximately one-third of all plants or plant products eaten by humans are directly or indirectly dependent on bee pollination.



Figure 1. Honeybee yard setup in the forestry area in the cold winter desert in Durmon village, Uzbekistan, June 2020.

Beekeeping has a significant impact on crop yields. It is scientifically proven that pollination by bees increases the yield by 25 percent and the number of shoots increases by 12–13 percent in cotton. At the same time maturity of the buds is

accelerated, and the quality of fiber and seeds improves.

## 2. IMPORTANCE OF BEEKEEPING IN CWD

Beekeeping is an important activity for the smallholders living in the CWD in Durmon. Four HHs are keeping honeybees which are mostly heritage from their parents, and the practice is continuing in the 3rd and 4th generation till now. At present, four smallholders are practicing beekeeping for domestic use and selling in the local market for cash income. Currently, 300-400 kg of honey is produced in Durmon village. The current beekeeping size of individual households is 15 to 20 hives which can be increased to 100 hives per family if supporting funds become available. Bees fed by orchards help in the pollinations of wild plants and crops in Durmon village.

## 3. FEEDING AND POLLINATION OF AGRICULTURAL PLANTS USING BEES

Flower juice is a sweet liquid that plants produce through special tissues and organs. Rose juice contains mainly sugars sucrose, glucose and fructose. This is a nutrient essential to the life of bees and is a source of energy in the bees' bodies. Depending on the type of tree and plant, the flower juice yields from 5 to 70 percent sugar. Bees absorb flower juice, which contains up to 50 percent of sugar. If the juice in the flower of the plant contains 5 percent sugar, or the fluid content of the juice exceeds 70 percent, then the temperature of the plant will be affected

by night temperatures, wind and extreme heat. Sufficient moisture, potassium and nitrogen are needed for good flower juice. Horticulture, vegetable growing, seed growing, melon growing, and cotton fields serve as a nutrient base for bees and provide successive bees with pollen. Trees such as apple, pear, quince, cherry, plum, cherry, apricot and peach play a major role in beekeeping.

#### 4. FEEDING BEES WITH SUGAR SYRUP

In the absence of honeybees in the restrooms, or where the juice-extracting plants have not yet blossomed, bee families are given sugar syrup. The juice consists of two parts sugar and three parts waters. The water to be added is heated to a boiling point in an enamel or similar container and the water is removed from the fire, adding the measured sugar and stirring with a stick.

During the fall, bee juice is prepared by adding 1 liter of water to 1.5 kg of sugar. The bees can easily break down complex sugar into ordinary sugar, and this form of sugar can be converted into sugar honey. Sugar juice is given to the bee family until the food is available in nature. The juice can be given to the bee family in the amount of 200 milliliters to 3 liters depending on the size of the bee family.

#### 5. NECTAR-EXTRACTING PLANTS AVAILABLE IN UZBEKISTAN

There are several types of crops grown in Uzbekistan, which are usually better suitable for honey production. Locally available fruit and aesthetic trees suitable for nectar/honey production are apricot, pear, plum, quince, almond, apple, walnut, peach, poplar, willow, birch, silk acacia, white acacia, gleditsia, chestnut and maple (Figure 2).

The locally grown crop plants suitable for honey production are cotton, maize, carrot, raps, buckwheat, yellow sweet clover, medicago,

coriander, hemp, ribes, raspberry, strawberry, cucumber, melons, pumpkin, and squash (Figure 3).



Figure 2. Locally available fruit and aesthetic tress suitable for nectar and honey production



Figure 3. Locally grown crop plants suitable for honey production

## **6. POLLINATION OF AGRICULTURAL PLANTS WITH BEES**

Establishing bee families in greenhouses, choosing a place for them, and organizing bees' flying outs from the greenhouse during hot weather are important for beekeeping preventing bees from suffocation. Such a facility is also important in adapting bees to pollinate crops such as tomatoes and cucumbers grown in greenhouses. This arrangement creates conditions for intensive nectar collections.

The following should be avoided so as not to disturb the bee families in the new location:

- a) Comply with the least possible hitting, pushing, shaking, and safety regulations during the relocation of bee families, i.e., minimize the physical disturbances.
- b) Do not expose the hive to light and avoid sunlight during transportation.
- c) Beehive nests should be kept in the new place as much as possible with vegetables.
- d) When the bee nests are directed at the juice-producing plants and placed along and/or horizontally, the bee families in the front row do not get stronger than the back row families.

## **7. BEEHIVE CONSTRUCTION AND REPAIR**

This includes the type and structure of bee nests; the history of the creation of bee cells; non-removable and removable slots; and regulatory requirements for beehives.

For collecting the beehive, heated pillows are placed on the top and sides. Also, barrier sheets and crutches are used in the beehive for transport.

## **8. EQUIPMENT USED IN BEEHIVE CONSTRUCTION AND MANAGEMENT**

- a) Beekeeping equipment and supplies: face masks, bee coats, incinerators, and bee cages.
- b) Structure of the devices needed to conduct wax curtains: wire reel, bracelet, rim holes, welding reel, and power tool for wax coating.
- c) Structure of equipment for breeding and sending of honeybees: spoon (spatula), wax bowls made of soft aluminum wire, frames for wax bowls, electric stove, and cage for mother bees.
- d) Structure of the tools required for weighing and processing of wax: beekeeper knives, scaffolds, honey pullers, swimmers, honey containers, various wax solvents, and case boxes.
- e) The beekeeper must prepare the necessary equipment before carrying out the work. These include a carry case, a dry rotting mat, manure, and a combustion device.
- f) Before starting work with the bee family in the restroom, one should put on a white robe and a hat.
- g) It is advisable to remove the inch wax frames from the hive and put back the young bees that have been poured out of the frame into the hive.
- h) If the lentils need to be cleaned from the bees, sweep the bees with a brush made of goose feathers or a rich bun. If there are no young bee larvae and freshly squeezed juices, it is possible to shake the bees by holding them on both sides of the frame.
- i) The inner size of the family is superficially examined while expanding the hives. The small frames are designed to extend the edges slightly. If the juice comes from nature, the bee family should be provided with wax cloth in the right place.
- j) During spring inspections, the bee family should not be disturbed for two to three weeks, after which they will be able to maintain normal family development. The care of the next spring

bee families will be mainly about accumulating their nutrients and expanding the internal size of the family using small frames.

## 9. HONEYBEE FEEDING, REARING AND MULTIPLICATION

In the middle of summer, between 60 000 and 70 000 hybrids, the bee family has a strong bee that grows in hives and has between 80 000 and 9 000 000 bees. Due to the large number of bees in the family, they will be able to collect enough nutrients for a short period of 20-30 days, until the next harvest season. As a result of the large number of bees living together in the community, the bees maintain the required condition and warmth in the winter.

The mother bee (Figure 4) is the only female in the family whose genitals are well-developed. It does no more than lay eggs. The length of the bee is 18-20 mm, average weight is 0.25 gr. Its abdomen is longer than its wings, and its wings do not cover the abdomen. The bee does not have a basket of pollen on its two hind legs. There are no wax windows in the abdominal joints. Proboscis is shorter than the worker bees.

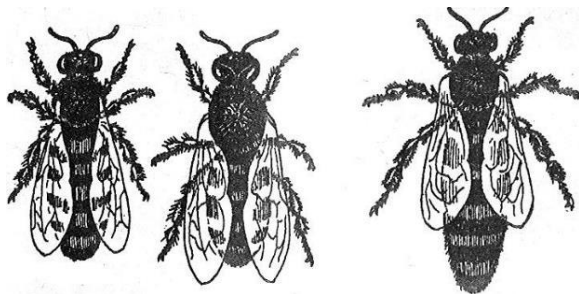


Figure 4. Worker (left), male (center) and queen (right) bees with different sizes

The worker bees occupy the bulk of the bees in the shed. They are female bees and have poor reproductive and ovary development, so they cannot mate with bees. In a normal family with a bee, they do not lay eggs, but do all the work in the family. In some cases, when they lay eggs, only the male bees develop from these eggs.

The worker bees do housekeep, guarding, normalizing the air, building a honeycomb, feeding worms, collecting juice and pollen, processing the juice, that is, honey, raising the temperature, and providing air and water to the hive.

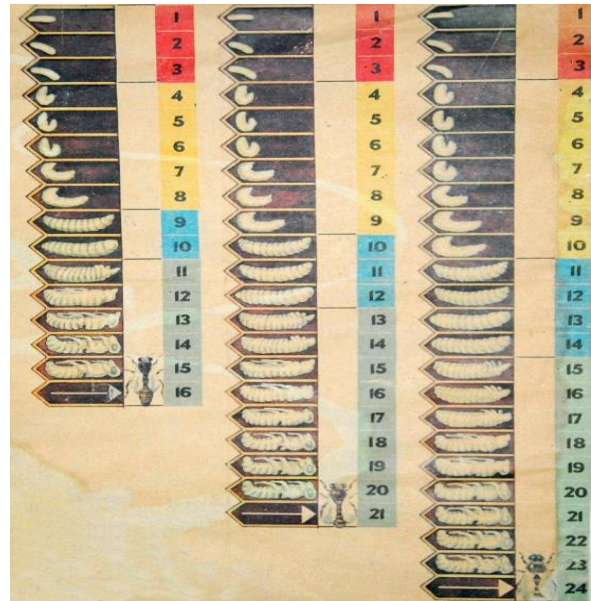


Figure 5. Larval stages of bees in days

In the bee families, with the spring warming, the bee increases the number of eggs laid daily and the number of larvae enclosed. The larvae mature and slowly grow out of inches and the number of young bees in the hive increases, the hive's extended position during the spring inspection becomes narrower and the family finally has to add tiny frames. It is possible to increase the internal size of the family within 20 days from the first days of spring. When the last mini frame of a family is raised to know how to expand the family's internal size, it is time to expand the family's internal size when the bees are completely covered. During the fall and spring reduction of the family size, a large number of lightweight frames are collected. This is a good selection

of good-quality drawings from the collected frames. The good quality frames are stored in separate boxes for future use; the bad and poor quality are thrown into the solution. The top of the rim of the milled-inch frames, provided for storage, provides a bit of honey, while also providing nutrients. As soon as the juice starts to come out, the waxes are made while expanding the inside of the hive. Strong bee families can be provided with 3 to 4 inches of rum. Thereafter, the expansion work will continue as the family progresses. As the weather warms up, the spaces for this expansion can be made directly in the middle of the family, where the bee lays eggs. It accelerates the cleaning of inches and laying eggs by the queen. The expansion of the family size will continue until the inside of the hive is filled with small frames. In the bed, however, there will be enough room to expand the hive's internal capacity throughout the season, and the juice available from nature can be accommodated.

In the middle of summer, there are between 60-70 thousand bees in the family of strong bees bred in breeding hives and between 80-90 thousand bees in the hybrid bee family. Due to the large number of worker bees in the family, they will be able to collect enough nutrients for a short period, i.e., within 20-30 days, until the next harvest season.

### **Queen bee production**

The quality of the queen bee depends on the conditions under which it is grown, and its genetic potential. The queen bee is the only bee family capable of producing workers and tens of thousands of workers are required for strong colonies. Healthy, fertile queens are capable of

laying eggs almost constantly, during peak season a quality queen can lay over 3 000 eggs per day - that's more than her body weight in eggs in a day. The queen bee can live up to seven years, its productivity commonly decreases after the first two years. A few beekeepers replace the queen when she dies, however, some other beekeepers replace it every year.

There is potential for all fertilized eggs to become a queen or a worker while unfertilized eggs become drones (male honeybees). Eggs hatch into larvae about three days after being laid. All larvae are fed royal jelly exclusively for the first three days after hatching. The term hatch or hatching is only used to refer to bee eggs hatching into larvae, the term emerge is used for when a bee emerges from its cell as an adult. Royal jelly is a sweet, protein-rich secretion exuded from the hypopharyngeal glands of worker bees.

The normal bee family consists of 50 000 to 80 000 working bees, hundreds of male bees and one queen.

### **Pests and disease in honeybee families**

All beekeepers must be aware of the diseases and pests that can afflict a colony. In Uzbekistan, the development of bee families is largely hampered by varroosis, acarapidosis, American and European decay, nematosis, askosferosis, pesticide poisoning and several other infectious and invasive diseases. Varroosis is one of the most dangerous diseases in the world today, with mites living parasitically in the body of working, male and young bees. The bee family may die if not treated with varroosis throughout the year.

Diseases of bees are divided into two groups: infectious and non-communicable diseases. One of the main ways to prevent bee disease is to visit all bee families every year according to the good, zoo-veterinary rules of a healthy family and to provide bees with additional antibiotic supplements in the spring. Where normal

beekeeping practices are taken, bees are rarely infected.

Many diseases of bees have almost identical symptoms. That is why only professionals can identify the disease and take effective treatment against them. Diagnosis is often made using different tools. Therefore, as soon as the earliest signs of the disease appear, it is necessary to take samples of the infected bees and their offspring to the nearest veterinary laboratories for problem identification and cure.

### **Economic benefits of beekeeping**

i) The nature of bee pollination and its importance on crop yield is well-known. When pollinating properly, the following positive results can be expected.

- Cotton yields increase by 27.9 percent
- Berries and fruits yield increase by 50-60 percent
- Alfalfa seed yield increased by three times
- Maturation of fruit seeds and cotton fiber accelerates and their improved quality

ii) In one season one honeybee family yields 20 to 30 kg of honey, 3 to 5 kg flower pollen, 2 to 3 kg perch, 200 to 300 g propolis, 300 to 500 g bee milk, 4 to 6 g bee venom, and 3 to 4 kg of wax.

iii) Considering that there are 143 000 bee families in Uzbekistan, it can produce 1 860

tonnes of honey, 312 kg of pollen, 195 kg of peroxide, 20 kg of propolis, 39 to 40 kg of honey, and 200 to 250 kg of beeswax. This is important in turning beekeeping into a profitable industry.

iv) To create convenience for the population, many specialized shops selling beekeeping products are being established. 60 beekeeping entities operated in Surkhandarya region in 2014, while last year their number reached 536, and the region produced more than 500 tonnes of honey. In addition, we can see huge growth and development stages in this sector in other regions of the country.

v) Packaging and storing

Honey is packed in barrels, cans and bottles. The best way to pack is to pack in barrels made of wax or lime wood. Crystallized honey is also packed into waxed holes. Aluminum or tin cans (up to 50 kg) are used for long-distance transportation.

Honey is stored in clean, dry, well-ventilated rooms with temperatures not higher than 100°C and relative humidity of no more than 75 percent. Honey can be stored indefinitely for a long time without changing the quality of mature and hermetically sealed honey.

UNIVERSITÄT GREIFSWALD  
Wissen lockt. Seit 1456



This publication is a result of the “Central Asian Desert Initiative (CADI)” project as part of the International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) supports this initiative on the basis of a decision adopted by the German Bundestag.

FAO. 2. University str., Qibray district, Tashkent region, 100140, Uzbekistan  
Email: [FAO-UZ@fao.org](mailto:FAO-UZ@fao.org), [www.fao.org](http://www.fao.org)



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