

A Report on Beekeeping in Macedonia for the Erasmus Let Bee Project

1. Climate

Because of the geographical location and the relief of Macedonia, the climate in the country is partly Mediterranean and Continental, and on the mountains with peaks over 2000 meters the climate is Mountainous. Generally, summers are hot in the valleys located at lower altitudes (e.g. in Skopje), where the maximum temperatures are usually around 30 °C. The temperature range is high and the moisture is not high, so the nights are cool, but the days can be scorching, with peaks of 40 °C and with minimal amounts of rainfall in the driest regions, with not more than 250 mm, while the most eastern and the most western parts are mountainous and summers are not with very high temperatures and with slightly larger amounts of precipitation. Sunshine is frequent, and the rains are relatively rare, occurring in the form of thunderstorms in the afternoon. Winters are generally mild with cold waves that can bring cold temperatures reaching up to - 20 degrees Celsius. In mountainous areas snow can reach a height up to over 1 meter.

Lately, in Macedonia, occurred unseasonal meteorological appearances that had negative effects on the life of the bees. These climate changes and their effects are negative on the life of the bees. The severe drought and hot winds in early spring and in summer can cause drying of honey flora, so because of that weak bee families regularly suffer from hunger if there is not any intervention by the beekeepers.

It is also interesting to mention that in the most southern part of the Republic of Macedonia, especial in the lower reaches of the river Vardar winters are quite mild so the queen bees usually don't stop laying eggs during the winter.

2. Honey Flows

Macedonia's relief characteristics are the main condition honey flow to occur in May and June (in lower areas) and in June and August in the mountainous regions, where, if there are conditions in August honey flow occurs on woody species that produce honeydew and the honeybees produce black (dark) forest honey called 'Medlichovets'.

The main honey comes from plants as white clover (*Trifolium spp*), vetch (*Vitsio spp*), thyme (*Thymus spp*), Blackberry (*Rubus fruticosus*). The most important of the woods species is white acacia (*Robinia pseudoacacia*). Thermopile herb that gives honey with very high quality is Christ's thorn (*Palirus spinosa*). In the mountainous parts there is a type of oak called Kuerkus producing honeydews on its fruits and leaves and from it bees produce black honey that is as well as the light honey highly appreciated among the consumers. In some parts of the country people grow oilseed rape and sunflower, but the honey produced of them is not good valued as the previous.

It is also important to mention that, due to the highly developed biodiversity of honey flora, 98% of the honey in the country is polyfloral. Some recent studies have shown that only 2% of the honey is monofloral and this honey is produced from white acacia (*Ribinia pseudoacacia*). This honey is very light in color, has a pleasant taste and smell and is easy to be consumed, which makes it highly sought after by buyers.

3. Major Beekeeping Organizations

At national level there are 2 national federations that are members of a larger umbrella organization called the Federation of Farmers of Republic of Macedonia that unites all farmers in the country. Organic beekeepers are each individually involved through the local associations of producers into the Macedonian Organic Producers Federation which represents exclusively the interests of organic producers.

4. Number of Beekeepers and Certification Status

There are two certification bodies in Macedonia: Balkan Biocert and Procert Control and Certification, and they are authorized from the Macedonian institutions to carry out the audits and certification. According to the Law on Organic Production of the Republic of Macedonia it is allowed, an organic apiary to be located in a location that provides honey vegetation (mostly wild), within a radius of 3 km. The law also allows a minimum of cultivated plants that must be grown extensively. Locations where beekeeping can be performed, according to the rules on organic beekeeping in Macedonia are much larger than those that are not appropriate for that purpose and therefore is expected the number of certified bee colonies in the next period to grow significantly. In addition to this is the fact that a large number of conventional beekeepers increasingly adopt the use of permitted inputs and techniques for organic production in their apiaries. The trainings that will be realized on this specific subject will also have positive impact on the development of organic beekeeping in the state.

Production of honey in Macedonia is very variable and depends mainly on climate change. In some exceptional years winter losses can reach over 40% of bee colonies in the next year the production may be lower, due to breeding of bee families for recovering of the lost number of bees. Also in April and May, because of bad weather conditions as it was this year and the inability for spring development of the colonies, the production can be minimal or at the state level approximately 4 kg per family.

5. Bee Health

5.1 Varroa

In Macedonia, the main problem that undermines the health of bees is the varroa and because of this beekeepers regularly treat their families once or several times a year. Conventional beekeepers use chemical protection usually applied by evaporation, but more advanced beekeepers use ecological protection, like formic and oxalic acid and Thymol.

5.2 American foulbrood

Bee colonies in Macedonia often suffer from American foulbrood. For spreading this disease great contribution have inexperienced beekeepers. For them is difficult to detect it

at an early stage and then when they will discover it, some of them try to treat it in an inappropriate way usually moving affected families away from their apiaries, with what they stimulate spreading of the disease. For this disease the state has prescribed a measure according which the colonies where on laboratory method American foulbrood is detected, should be burnt and the beekeeper to be compensate for caused damage.

6. Environmental Health issues

Winter losses

Because of bad weather conditions in winter months there are losses that are normally in the limit to 10% of the winter cluster, but in some cases, as in 2001 the percentage of winter loss was over 40%. In the mountainous parts of the country, when the bees have collected dark forest honey as a reserve for the winter, if there is a longer period of time with low temperatures dying of bee colonies arises. The reason for this is that at low temperatures bees are not able to get out on a purifying flight and then comes to inflammatory bowel disease caused by the crowded indigestible substances from the dark forest honey. To avoid this, in autumn beekeepers completely remove the dark honey and fed the bees additionally with sugar syrup.

Farming

In the agriculture in Macedonia every year there are more and more developments and modernization but still large areas of agricultural land is not cultivated. Because the relief of the country is mostly mountainous, areas with wild vegetation are far more common than the cultivated agricultural areas. Also the areas where the intensive agriculture is practiced are represented by much lower rate than agricultural areas with extensive farming. Incidents of poisoning with insecticides of the bees that have been grazing on some fruit trees, such as plum or peach sometimes occurs. These incidents are the result of lack of education of beekeepers and fruit growers and their incoordination during the work.

6. Strains of Bee

6.1

Republic of Macedonia is a home to the Macedonian bee *Apis Melilefera Macedonica*, which is perfectly adapted to live in these areas, on the climate, relief, floral and other conditions here. At the time when Macedonia was in union with SFRY major beekeepers practiced beekeeping with moving, that means transporting bees to the Republic of Serbia in the Pannonian Plain full of acacia and sunflower. In such migrations there were cases of hybridization or interbreeding of our *Apis melilefera macedonica*, with *Apis melilefera carnica* and because of that in some researches on the racial origin of the bees from Macedonia, genes of Carnica were found. In more recent times there is also intake of yellow bee in the country by illegal importers.

6.2

Bees of the type *Apis Melilefera macedonica*, are best adapted to the climate conditions of this territory, they are the best wintering and are most resistant to the stresses resulting from climate changes. The main problem of the imported breeds is that they save food during the winter and their queens lay eggs during the period when they should be inactive and therefore losses in winter are much larger.

6.3

The beekeepers who during their beekeeping follow the principles of organic beekeeping are generally representatives of cultivation of local strains of Macedonian bee, which is maybe not the most productive breed in the world, but in local conditions still achieves best results.

7. Commercial Beekeeping Systems

7.1

Commercial beekeeping in Republic of Macedonia means beekeeping with over 400 beehives placed in Langstroth hives or Farrar, that are regularly moved on 3 or more pastures, starting from oilseed rape, meadow, sunflower, chestnut and mountain pasture. An additional food is white sugar in form of solution or invert sugar in quantities up to 15 kg per colony. Treatments against the varroa are a combination of conventional pesticides and environmental assets. Queen bees are usually produced on the farm itself using Jenter kit, by replanting larvae with a needle or with some local techniques. Swarming is artificial by separating of worker bees and adding fertilized or unfertilized queen or a mature queen. For replace of the queens are used queens produced on the farm or queens bought from a breeding center.

7.2

The treatment of varroa was using synthetic pesticides 10 years ago, but today we can notice replacement of these chemical means with ecological ones: as oxalic acid, formic acid and Thymol. New environmental treatments are well accepted by the younger and innovative beekeepers, but older beekeepers 'do not give up' using of synthetic pesticides. Organic beekeepers use measures for biological protection of bees and in progress is selection of resistant on varroa strains of bees.

7.3

In winter and spring most of the beekeepers practice feeding of the bees with sugar-honey dough which it is added onto the entrance. Some beekeepers practice beekeeping, which means leaving enough amounts of honey in the hive in autumn and if is necessary,

they push the frame with honey near to the nest or they just `open` the capped honey, how could bees themselves bring it from the ending sections of the beehives closely to the nest.

The most critical period in the life cycle of bees is between January and February when queen bees begin to lay eggs. If there is a longer period of bad weather with low temperatures in the mornings that go down below 10 degrees Celsius and daytime temperatures don't go more up then +10 degrees, the bees don't leave the cells and they are stuck in a space where the all winter honey is spent. Even that on the frames at the end of the hive there is enough amount of honey, bees may starve to death if the beekeeper does not intervene by adding additional food that must be located just above the entrance of the beehive.

7.4

Extraction of honey is made by taking out of frames covered with mature honey. Honey caps are removed with uncapping fork, knife or electric honey uncapping knife. Beekeepers often use tangential or radial **extractors** from which after spinning the honey is packaged in plastic cans and after a certain time the honey is usually packed in jars of 720 ml or smaller. Some beekeepers sell honey to resellers in containers of 20 to 30 kg as liquid or crystallized.

7.5

In Macedonia commercial bee pollination of fruit trees or other cultivated plants is still at the beginning. Instead of it, there are very often cases of poisoning of the bees with insecticide when they visit an orchard in blossom that is **sprayed with insecticide** by the owner of the orchard, because the owner is not educated about the damages that can happen to the bees. In Macedonia agreements between beekeepers and farmers related to pollination of cultivated plants are not yet concluded.

7.6

The **supply** of queen bees in the country is provided by 2 repro centers that produce breeding material. This activity is supported by the state subsidy by 50% of the costs for the queens. There are also beekeepers who produce queen bees for their own and they use them and sell the excess on the local market of queen bees.

8. Hobby Beekeeping

Small beekeepers who own few beehives are considered hobbyist beekeepers and they produce small amounts of honey mostly for their own needs. Beekeepers who own

more than 35 beehives are producers and they produce extra honey products and sell it on the local market or their customers are local people who buy directly from the beekeeper. These beekeepers receive 10 euro in subsidies from the state as a stimulus for this activity, that has to be declared as an additional activity, because their main source of existence usually must be another activity. More than 100 beehives own semi-professional or professional beekeepers whose main source of funds for life is the beekeeping business.

9. Ecological Beekeeping

9.1

Organic beekeepers are located mainly in the mountainous areas of Macedonia and they usually own 40 to 100 beehives. The quantity of their honey is lower than that of the conventional beekeepers that move their hives, and the cost of organic honey is ranged from 0% to 30% higher than the price of conventional honey and usually depends on the quality of honey and from the commercial and marketing skills of the beekeeper.

One of the problems that organic farmers are facing is the lack of organic wax on the Macedonian market, which should be a substitute for conventional wax in the combs of the bee families. Because of that beekeepers are obliged to replace conventional wax with a wax produced from the wax caps or with wax from the frames for building, which is also used as a biological way of fight against a varroa. This process takes long time and even more, in the last years the meteorological conditions for production of wax are not good. After the beekeepers will produce their own organic wax, it is processed into organic honeycomb foundation by the certified companies. Shaping the wax into a honeycomb foundation big part of organic beekeepers do themselves with special presses that are made by themselves or supplied by sale. Number of certified beehives in last years is as follows.

Table of number of certificated bee colonies per year:

Year	No. of organic <i>certificated</i>	No. in a procedure of certification	Total
2010	9444	4443	13887
2011	8777	4804	13581
2012	6065	2938	9003
2013	1238	5121	6359
2014	5357	928	6285
2015	5566	1366	6932

9.2

In Macedonia the most common types of beehives are Dadant – Blatt and Langstroth – Ruth types of beehives, and in some apiaries the bees are kept in home-made hives with immoveable honeycomb.

In Macedonia there are not certified biodynamic beekeeping farms, but there are attempts of practicing biodynamics methods in beekeeping, on few beekeeping farms.

In our country treatments for protection against varroa are common to each apiary and it is enough to reduce the varroa attack at harmless level at least once a year. But must be mentioned, that experimentally set, untreated families in the year 2016, in general, mostly died.

In nature, in hollow trees or rocks 'wild' bee families can be found, that are certainly not treated with any protective substances against varroa, but experiences shows that such beehives cannot last for more than 3 years.

10 & 11 Any other Relevant Information

As far we don't have any beekeeper with certificate for biodynamic production in Macedonia, for this form of production, some of organic beekeepers are interested to meet with, to learn and to gain some knowledge on biodynamic production and its features. The Macedonian organic beekeepers have a need for education on this subject and that way of living.