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TREATMENTS OF BEE DISEASES IN BULGARIAN ORGANIC BEEKEEPING

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Disease / Cause agent

Time of appearance and predispose factors

Age of brood

Typical Symptoms / Changes of bee larvae

Diagnose / Therapy

Follow actions

American foulbrood (AFB) / Paenibacillus larvae (White)

Mai-July, hot weather, lack of nectar and pollen flow

Sealing brood

Bacterial diseases

Between ill found health brood, hollow top of the dark cells / Bee larvae stick tightly to the cells. Mucilage sharpens long mass after trying to extract bee larvae from the cell with sharp object. Putrid odor. [2]

Fast test for diagnostic – Vita (Europe) LTD (www.vita-europe.com)[4] Diagnose must be confirm by laboratory. / Not allowed antibiotics!

American foulbrood presents in Bulgaria.

As antibiotic treatments are not allowed following preventive measures are used:

- fast tests for diagnostics - Vita (Europe) LTD (www.vita-europe.com) [4], confirm by laboratory;
 - destruction of diseased bee families (burning);
 - transfer of bees into new hives with new honeycombs [7];
 - disinfection – NaOH solutions for disinfection of the hive, then neutralised by organic acids [1; 9] Equipment should be immersed in at least 0.5% hypochlorite for 20 minutes [11].
 - Hands of the beekeeper must disinfect before and after work with ill hives. Clothes – with boiling water;
- and
- laboratory control (1 year quarantine of apiary after last positive sample);



Field test for American Foulbrood



Burning



Transfer of bees [7]



Disinfection

| Disease / Cause agent | Time of appearance and predispose factors | Age of brood | Typical Symptoms / Changes of bee larvae | Diagnose / Therapy | Follow actions |
|--|--|---|---|---|--|
| <p>European foulbrood (EFB) / <i>Melissococcus pluton</i></p> | <p>Mai-Jun, lowering of the temperatures, shortage of nectar and pollen flow</p> | <p>Unsealing brood (in some cases and sealing brood)</p> | <p>Between ill found health brood, hollow top of the yellow and brown cells / Bee larvae not stick tightly to the cells. Mucilage sharpens short mass after trying to extract bee larvae from the cell with sharp object. Acid odor.[2]</p> | <p>Fast test for diagnostics (Vita-Europe Ltd [4], confirm by laboratory / Not allowed antibiotics.</p> | <p>European foulbrood presents in Bulgaria. As antibiotic treatments are not allowed following preventive measures are used:</p> <p>Fast tests for diagnostics - Vita (Europe) LTD (www.vita-europe.com) [4], confirm by laboratory;</p> <p>The severely affected bee families were destroyed. The less severely affected families were cured as follows:</p> <ul style="list-style-type: none"> • removing and melting the combs with affected brood; • moving bee families into new hives or used hives, disinfected with 4% sodium hydroxide; • narrowing of nests until all combs were crowded with bees; • restriction of queens until sealing healthy brood and sanitation of the hive by bees; • replacement of older queens with younger ones; • supplementing bee families with carbohydrate and protein food [6] <p>Equipment should be immersed in at least 0.5% hypochlorite for 20 minutes [11]. Hands of the beekeeper must disinfect before and after work with ill hives. Clothes – with boiling water;</p> <p>The quarantine in affected apiaries was cancelled one month after the sanitation or the destruction of the last affected bee colony.</p> |
|  | <p>[15]</p> |  | | | |
| <p>Healthy brood</p> | | <p>European foulbrood</p> | | | |

Disease / Cause agent

Time of appearance and predispose factors

Age of bees

Typical Symptoms / Changes of bee larvae

Diagnose / Therapy

Follow actions

Septicaemia from bacterial causes / Hafnia alvei, Pseudomonas aeruginosa, E. coli, Salmonella, Citrobacter sp. etc.

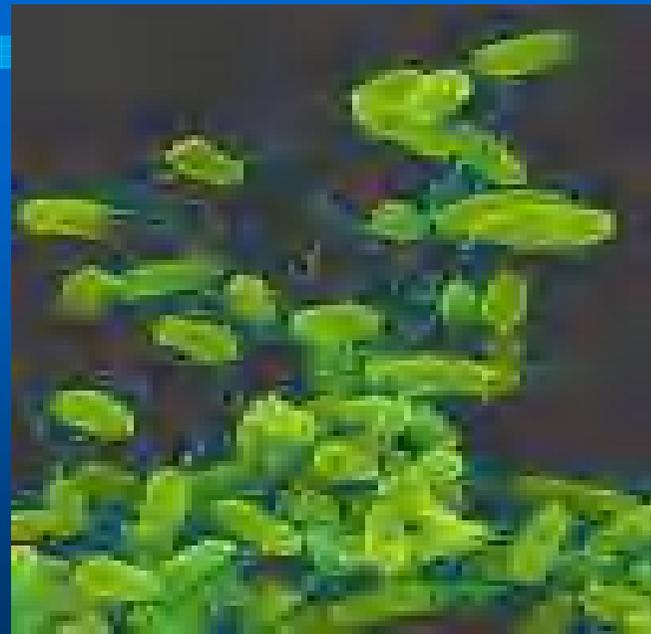
March-Jun or September, lowering of the temperatures, shortage of nectar and pollen flow

Adult bees have disorders

Crowded dead bees easily crumbled[2]
Similar Nosematosis (Nosema apis) symptoms - diarrhoea.

Laboratory diagnose / Not allowed antibiotics.

Quarantine of apiary, destruction of ill combs (burning), and shake of bees in new hives with new honeycombs. Requeening of the hive. Carbohydrate and protein feeding of bees.



| Disease / Cause agent | Time of appearance and predispose factors | Age of bees and brood | Typical Symptoms / Changes of bee larvae | Diagnose / Therapy | Follow actions |
|--|--|---|---|--------------------------------------|--|
| <p>Acute bee paralysis virus (ABPV) or (APV)</p> <p>Israel acute paralysis virus (IAPV)</p> <p>Kashmir bee virus (KBV)</p> <p>Black Queen Cell Virus (BQCV)</p> <p>Chronic Paralysis Virus [CPV]</p> <p>Cloudy Wing Virus (CWV)</p> <p>Deformed Wing Virus (DWV)</p> <p>Sacbrood virus (SBV)</p> <p>Kakugo virus (KV)</p> <p>Varroa destructor virus 1</p> | <p>Lowering of the temperatures, shortage of nectar and pollen flow</p> | <p>Different ages of bees and brood</p> | <p>Viral diseases</p> <p>Paralysis deformed wings of bees etc.</p> | <p>As septicaemia Sacbrood -</p> | <p>from bacterial causes as European foulbrood</p> |
|  |  | <p>[15]</p> | | | |

| Disease / Cause agent | Time of appearance and predispose factors | Age of brood | Typical Symptoms / Changes of bee larvae | Diagnose / Therapy | Follow actions |
|---|--|---|---|--|--|
| Fungal diseases | | | | | |
| Chalkbrood / Ascosphaera apis | A fungal disease - infests the gut of the larva. Most commonly visible during wet springs. | The fungus will compete with the larva for food, causing it to starve. | The fungus then goes on to consume the rest of the larva's body (white and 'chalky' appearance). | Visual and laboratory diagnose | Improvement of worker bees hygienic behaviour by management and selection. Powdered sugar dusting, which encourages cleaning behaviour of bees. Requeening of the hive and increasing the ventilation. |
|  | | | | | |
| Stonebrood / Aspergillus fumigatus, Aspergillus flavus and Aspergillus niger. (Common soil inhabitants; pathogenic also to other insects, birds and mammals.) | The gut growing rapidly to form a collar like ring near the head. | When a bee larva takes in spores they may hatch in the gut. It causes mummification of the brood. | The fungus erupts from the integument of the larva and forms a false skin. After death the larvae turn black and difficult to crush, hence the name stonebrood. | Visual and laboratory diagnose. The disease is difficult to identify in the early stages of infection (the spores of the different species have different colours). | As Chalkbrood |
|  | | | | | |

[15]

[15]

| Disease / Cause agent | Time of appearance and predispose factors | Age of bees | Typical Symptoms / Changes of bee larvae | Diagnose / Therapy | Follow actions |
|----------------------------|--|------------------------------|--|--|--|
| Pests and parasites | | | | | |
| Varroa destructor | Parasitic mites that feed off the bodily fluids of adult, pupal and larval bees. Varroa in combination with Deformed Wing Virus and bacteria have been theoretically implicated in Colony Collapse Disorder. Bees that are infected with this virus during their development will often have visibly deformed wings. Varroa are generally not a problem for a hive that is growing strongly. | Adult, pupal and larval bees | Varroa mites can be seen with the naked eye as a small red or brown spot on the bee's thorax | Visual and laboratory diagnose Different chemicals are allowed as ecological therapeutics for varroaosis. Recently we have some researches for essential oils from medical herbs – see “Hissopus officinalis L. essential oil for varoa control “(P.Nenchev, Lecture 18 from „1-st World Conference on Organic Beekeeping”) | Broodright colonies [9] “ Apilife Var - Evaporating tablets” with thymol, eucalyptus, camphor and mentol (Chemical Life, Italy), (http://www.beekeeping.com/chemical-laif/index.htm) [8] – low dosage:1 tab broken in 3-4 pieces on the lath holding the comb, 3-4 times after 7-8 days;high dosage:2 tabs broken for 2-3 pieces for 12 days, tenn repeat the same sdministration 1 time. Ecostop (plates) (with thymolum and oleum menthae) – Primavet-Sofia, Ltd [5]-1-3 plates on the top of the brood frames, spryng and autom. Apiguard (with thymol) - Vita (Europe) LTD (www.vita-europe.com)[4] - put the tray on the top of the brood frames, after 2 weeks - a second tray, last treatment after 4-6 weeks Thymol (Powdered crystals) – evaporate by loading into special frames Formic acid – 60% vapor; pads with absorbent material (40 ml from 60% F.acid) or gel packs "Mite-Away"[3] Broodless colonies [9] Oxalic acid – spray, drible or evaporation methods |



[15]

Varroa destructor on a honey bee larva and bees

**Disease
/ Cause agent**

**Acarine
(Tracheal)
mites
/
Acarapis
woodi
-not been
discovered in
Bulgaria**

**Time of
appearance and
predispose factors**

Tracheal mites

Age of bees

Adult and young
bees

**Typical Symptoms
/ Changes of bee larvae**

Adult bees couldn't fly

**Diagnose
/
Therapy**

Diagnosis for tracheal mites involves the dissection and microscopic examination of a sample of bees from the hive (laboratory diagnose).

/
If in Bulgaria in the future found acarine mites they must be controlled with grease patties (1 part vegetable shortening mixed with 3-4 parts powdered sugar) placed on the top bars of the hive. The bees come to eat the sugar and pick up traces of shortening, which disrupts the mite's ability to identify a young bee. Some of the mites waiting to transfer to a new host will remain on the original host. Others will transfer to a random bee - a proportion of which will die of other causes before the mite can reproduce.

Menthol, either allowed to vaporize from crystal form or mixed into the grease patties, is also used to eventually treat of acarine mites.

Follow actions

Quarantine for 1 year for apiary after therapy, followed with negative laboratory control.



Disease / Cause agent

Time of appearance and predispose factors

Age of bees

Typical Symptoms / Changes of bee larvae

Diagnose / Therapy

Follow actions

Nosema / microsporidia

Winter and spring; lack of nutrition; honeydew honey for winter nutrition

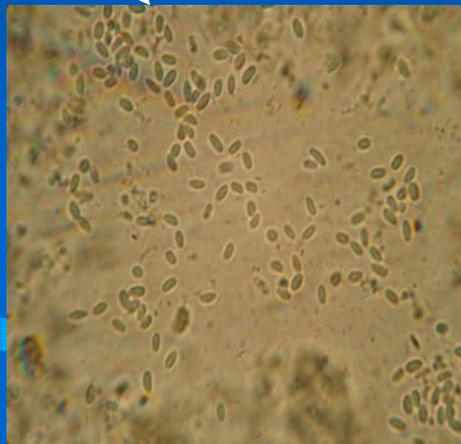
Flying bees / queen

Disorders / ill bees have white color of middle intestine

Visual and laboratory diagnose / Removal of honeydew honey and transfer bees in disinfected hives.

Hives and other tree and metal materials (centrifuge, equipment etc.), disinfect with 2% solution of NaOH as foulbrood diseases [1; 9].

Nosema apis and recently by Nosema ceranae



A Bulgarian biological preparation is used Nosestat ("Primavet – Sofia", Ltd. [5]), (iodine, potassium iodide and formic acid showed high efficiency – treatments with sugar solution 3 times at intervals of 3 days and repetition of the sheme after 7 days. [12; 13; 14].

Hands of the beekeeper - disinfect before and after work with ill hives. Clothes - treat with boiling water.

Absence of cause agent in disinfected hives must be proved by laboratory.

Extracts of plants that are environmentally safe and non-toxic for the humans - "ApiHerb", "Chemical Life", Italy [8] – feeding with sugar solution for 3 weeks.



| Disease / Cause agent | Time of appearance and predispose factors | Age of brood | Typical Symptoms / Changes of bee larvae | Diagnose / Therapy | Follow actions |
|--|---|--|--|---|---|
| <p>Small hive beetle / <i>Aethina tumida</i></p> <p><u>-not been discovered in Bulgaria</u></p> | <p>This is a small, dark-colored beetle that lives in beehives</p> | <p>Comb slimed by hive beetle larvae. Hives infested at this level will drive out bee colonies.</p> |  | <p>Visual and laboratory diagnose / If be found in Bulgaria must used alternative controls (cooking-oil-based bottom board traps).</p> | <p>Strong borders control; Principal information for beekeepers : The life cycle of this beetle includes pupation in the ground outside of the hive. Controls to prevent ants from climbing into the hive are believed to also be effective against the hive beetle with using of diatomaceous earth around the hive as a way to disrupt the beetle's lifecycle.</p> |
| <p>Wax moths / <i>Achroia grisella</i> (small wax moth) → and <i>Galleria mellonella</i> (greater wax moths) →</p> | <p>Not attack the bees directly, but feed on the wax used by the bees to build their honeycomb.</p> | <p>When honey supers are stored for the winter in a mild climate, or in heated storage, the wax moth larvae can destroy portions of the comb, even though they will not fully develop. Because wax moths cannot survive a cold winter, they are usually not a problem for beekeepers in the northern The destruction of the comb will spill or contaminate stored honey and may kill bee larvae.</p> |  | <p>Visual and laboratory diagnose / Damaged comb may be scraped out and will be replaced by the bees. Treatments with <u>B401(Bacillus thuringensis)</u> – Vita (Europe) LTD (www.vita-europe.com) [4] – diluted with water to 5% (1 vol. B401 for 19 vol. of water) -1,5 ml from solution per 10 cm² of comb.</p> | <p>Freezing storage of becombs could prevent disease because freezing kills wax moth larvae and eggs.</p> |

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http://en.wikipedia.org/wiki/Diseases_of_the_honey_bee