BeeHelpful
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PrimalBee® System

Anti-varroa Formic Acid Treatment

Premise

Please note the following operations are guidelines only:

PrimalBee® System allows the use of every kind of **current** anti-varroa treatment. PrimalBee® System's superior nest performance affects treatment efficacy, therefore fine tuning is required to adapt an existing treatment methodology to the PrimalBee® System. During twelve years of R&D the BeeHelpful team tested most of the existing methods and procedures. We selected formic acid pads as the best anti-varroa treatment because they are easy to use, cheap and effective; therefore you can use it as the only anti-varroa treatment all year round.

Formic acid has shown advantages such as: the varroa mite has never developed formic acid resistance, it works in capped brood cells too and against the tracheal mite as well, it is a natural ingredient of the bees' and ants' venom, in EU it is used as a food preservative (E236), it is cheap and easy to obtain. Some safety hardware, precautions, and handling techniques are necessary for formic acid manipulation. Provide yourself with a pair of rubber gloves, safety mask, and protective glasses.
Formic acid is usually sold at 85% water dilution rate, rarely 75%. PrimalBee® System formic acid treatment is made by 65% water dilution.

Carefully read and understand the enclosed dilution tables, to obtain the required 65% dilution, just add water accordingly. A dilution mistake might lead to an ineffective treatment or, worse, severe colony damage.
A PrimalBee® System fully developed colony may have even more than double the Langstroth population, hence more than one formic acid pad might be required for one anti-varroa treatment cycle. It is a matter of experience and varroa infestation rate. In any case it is the beekeeper's responsibility to correctly manage the PrimalBee® System hives, the correct time and treatment procedures, and any consequence on colony development in the apiary. Other diseases, e.g. nosema ceranea, should be checked and eventually treated.

MiteGone® formic acid anti-varroa treatment

BeeHelpful has conducted all the required trials to compare the right formic acid use and dosage in the last decade. BeeHelpful opinion is that the slow evaporation MiteGone® [1] pads from Canada provide the best efficacy and cost-results ratio.
We strongly recommend to read full MiteGone® instructions on their website: www.mitegone.com. Then you will better follow our further instruction as below.
As for the high thermodynamic efficiency of the PrimalBee® System nest, the original MiteGone® pad evaporation surface and the quantity of pads in each hive must be reduced.

1 MiteGone® is USA and Canada patented. It is beekeeper's duty to check if he must use the MiteGone® pad or if he is free to use a self made version.

Applications during the year, time and qty

Several years of BeeHelpful tests in the Alps from an altitude of 100 masl up to 2000 masl, BeeHelpful suggests the following anti-varroa treatment cycles to be applied to any PrimalBee® System colony:

When to apply the treatment

1. At the end of the Winter.
   When the very first blossom takes place.
2. Summer
   July and August, when varroa infestation is at its highest
3. Autumn
   Thanks to the PrimalBee® System nest efficiency, with the full top cover well in place and without opening it, formic acid evaporation could last from October till February. A formic acid saturation that long and in a brood-less colony assures a very low infested colony and a better Spring build up.

The constant evaporation capability and formic acid efficacy inside the PrimalBee® System nest is most related to the colony thermo-regulation capability, and almost unrelated to the external temperature, weather conditions or season; it is a PrimalBee® System hive peculiar characteristic.

How many pads to insert

Full developed colonies, 6 - 8 frames:.....2 pads
Colonies in development, less than 6 frames:.....1 pad
Highly infested colonies:.....+ 1 pad

Single pad duration

With Beehelpful methodology, the slow rate evaporation MiteGone® pad inside the PrimalBee® System nest will last longer than in a standard hive. Formic acid vapors are uniformly spread inside the nest, thanks to its thermodynamic efficiency. Single pad duration is mainly related to colony dimension and, lesser, to season.
A fully developed colony of eight PrimalBee® frames in summer could evaporate the amount of formic acid in less than two weeks, but the average duration of the pad is between three weeks and four months, depending upon the expansion or contraction of the colony.
The purpose of formic acid treatment is to kill the varroa by saturation of the nest environment for as long as three weeks time, therefore check the formic acid presence and insert another pad if required. To check the formic acid presence inside the hive unplug the hole in the first top cover or sniff by the entrance. Do not open the nest.

Pad preparation and insertion

The following instruction better explains how to prepare and insert the formic acid pad.

DISCLAMER

Formic acid is a dangerous substance. Before working with formic acid the beekeeper must provide himself with a pair of rubber gloves, safety mask, protective glasses.
<u>Always work in an open space enviroment.</u>

Formic acid dilution table[4]: from 85% dilution ratio to final 65%

65% formic acid, to be used for PrimalBee System pad	85 % formic acid, as from the market	H2O to be added to the market 85 % dilution
CH_2O_2 65%	CH_2O_2 85%	H_2O
ml	ml	ml
100.00	76.47	23.53
110.00	84.12	25.88
120.00	91.76	28.24
130.00	99.41	30.59
140.00	107.06	32.94
150.00	114.71	35.29
160.00	122.35	37.65
170.00	130.00	40.00
180.00	137.65	42.35
190.00	145.29	44.71
200.00	152.94	47.06
210.00	160.59	49.41
220.00	168.24	51.76
230.00	175.88	54.12
240.00	183.53	56.47
250.00	191.18	58.82
300.00	229.41	70.59
350.00	267.65	82.35
400.00	305.88	94.12
450.00	344.12	105.88
500.00	382.35	117.65
600.00	458.82	141.18
650.00	497.06	152.94
653.85	500.00	153.85
700.00	535.29	164.71
800.00	611.76	188.24
900.00	688.24	211.76
1000.00	764.71	235.29
1307.69	1000.00	307.69
1500.00	1147.06	352.94
1961.54	1500.00	461.54
2000.00	1529.41	470.59
2500.00	1911.76	588.24
2615.38	2000.00	615.38
3000.00	2294.12	705.88
3500.00	2676.47	823.53
4000.00	3058.82	941.18
4500.00	3441.18	1058.82
5000.00	3823.53	1176.47
6000.00	4588.24	1411.76
6538.46	5000.00	1538.46
7000.00	5352.94	1647.06
8000.00	6117.65	1882.35

4 International System of Units (SI)

Formic acid dilution table[5]: from 75% dilution ratio to final 65%

65% formic acid, to be used for PrimalBee System pad	75 % formic acid, as from the market	H2O to be added to the market 75 % dilution
CH_2O_2 65%	CH_2O_2 75%	H_2O
ml	ml	ml
100.00	86.67	13.33
110.00	95.33	14.67
120.00	104.00	16.00
130.00	112.67	17.33
140.00	121.33	18.67
150.00	130.00	20.00
160.00	138.67	21.33
170.00	147.33	22.67
180.00	156.00	24.00
190.00	164.67	25.33
200.00	173.33	26.67
210.00	182.00	28.00
220.00	190.67	29.33
230.00	199.33	30.67
240.00	208.00	32.00
250.00	216.67	33.33
300.00	260.00	40.00
350.00	303.33	46.67
400.00	346.67	53.33
450.00	390.00	60.00
500.00	433.33	66.67
576.92	500.00	76.92
600.00	520.00	80.00
650.00	563.33	86.67
700.00	606.67	93.33
800.00	693.33	106.67
900.00	780.00	120.00
1000.00	866.67	133.33
1153.85	1000.00	153.85
1500.00	1300.00	200.00
2000.00	1733.33	266.67
2250.00	1950.00	300.00
2500.00	2166.67	333.33
3000.00	2600.00	400.00
3500.00	3033.33	466.67
4000.00	3466.67	533.33
4500.00	3900.00	600.00
4615.39	4000.00	615.39
5000.00	4333.33	666.67
6000.00	5200.00	800.00
7000.00	6066.67	933.33
7500.00	6500.00	1000.00
8000.00	6933.33	1066.67

5 International System of Units (SI)

PRACTICAL INSTRUCTIONS FOR THE PREPARATION OF FORMIC ACID PADS

Dear PrimalBee Customer,
you can start from a standard sponge as usually available at any hardware store or florist shop



Cut the sponge in half by the longer side

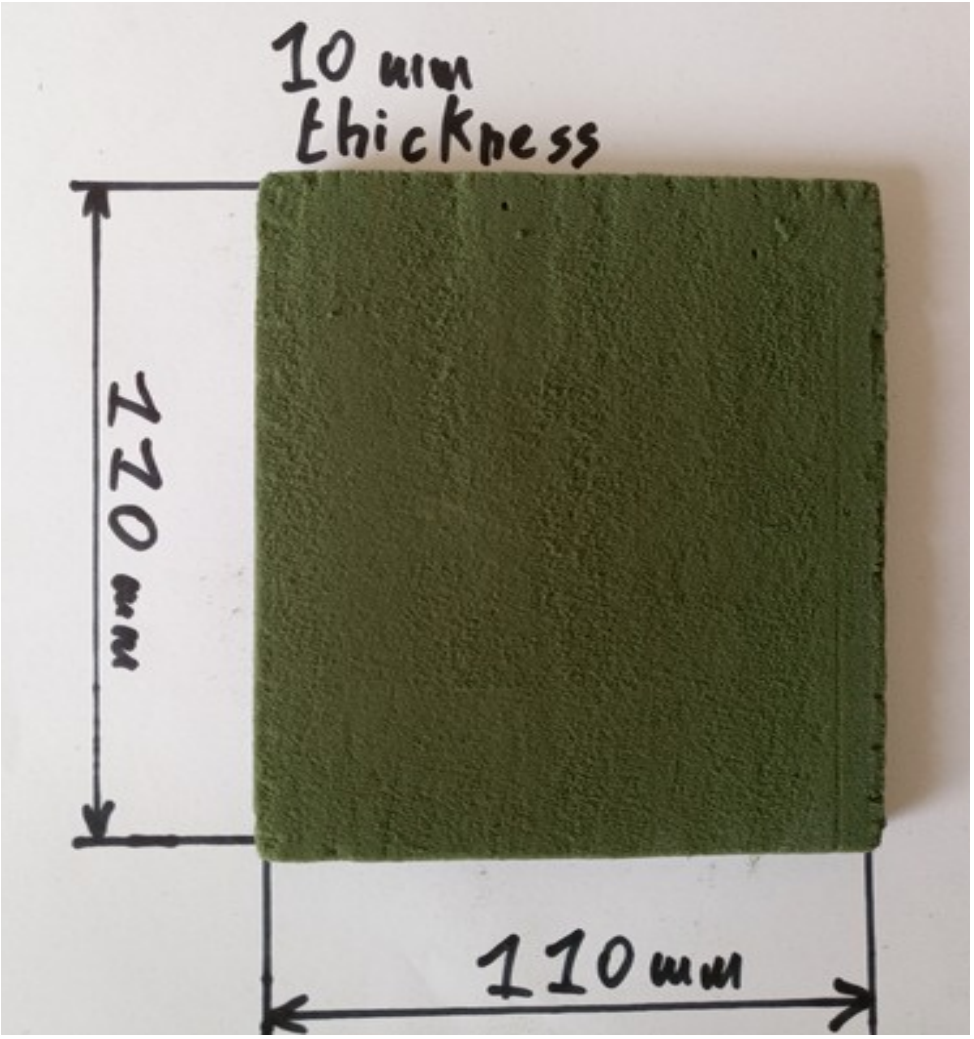


Disclamer: this page instruction doesn’t apply in US and Canada



From the half sponge cut a 10 mm thick slice, this is the pad you need.

The 10 mm thickness allows the pad to be inserted above the nest frames and without interfering with the inner surface of the cover with a hole, when the nest is closed.



Disclamer: this page instruction doesn’t apply in US and Canada

Fill the pads

As long as you have filled the pads with formic acid, you must reduce the evaporation surface





Wrap the pads

With a transparent plastic film, such as the one used for food or packaging, wrap the pad completely.
You can leave the original MiteGone film or you can take it away.





Please note : the pad in these photos was not filled with formic acid, just as it was simpler to illustrate the procedure

Pad wrapped



Completely wrap the formic acid soaked pad to close its evaporation surfaces

Open the right evaporation surface on <u>one side</u> of the pad

Formic acid evaporation cut should be 2 inches long



Using a sharpened cutter open a 2 inches long clean cut, as showed.

You need a clear cut, be careful and try not to tear the pad.



Please note, when you will be accustomated with this procedure and the PrimalBee System responses, you might want to change the cut lenght to obtain a different evaporation ratio.

E.g.:
a) Huge colony and hot summer => shorten the cut.

b) Clustered colony and cold winter => stretch the cut.

As always with bees, it is also a matter of trial and error.

Place the pad into the hive



Horizontally place the pad on top of the nest frames.
In some seasons the bees might lay over a part of the nest frames, probably near the front of the hive: place the pad near the bees.
Close the nest with the top cover hole plugged.
Make sure there is no overlap between the hole in the top cover and the pad position, or you will not be able to feed the colony.
The top cover must be properly positioned and closed.
The full system closure should be made by the top cover with the plugged hole, an empty honey superior box, the top cover without the hole and a strap to tight all the parts together with the hive. Make sure that the pad position, its thickness or the presence of debris will not create small leaks in any closure, the treatment would be less effective.
Normally, if the supplied base has the plastic tray for varroa counting, this tray should be inserted, to contain the internal atmosphere which will be saturated with formic acid.
In hot climate, however, it might be appropriate to remove the tray to allow the bees to ventilate the nest.