The apiary with HAPPYKEEPER

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HAPPY KEEPER

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THE APIARY WITH THE HAPPYKEEPER TUBES BOTTOM BOARDS

- 1 -
VENTILATION OF BEE HIVES

On the Internet, we find numerous scientific studies on the way termites or ants set about to control the atmosphere in their nests. Many of these insects collect vegetables as substrates of culture for mushrooms on which they feed. And this culture asks for rather precise conditions of temperature and humidity. Hence the interest of the researchers for the understanding of the used means.

Bees do not cultivate mushrooms! But they raise brood which needs a rather high temperature, around 35 °C. To produce this temperature, they naturally have to consume some honey, which generates humidity and carbon dioxide.

We find studies concerning the influence of the temperature of the brood on bees to be born, but there seems be no study concerning the way bees set about to regulate the rates of carbon dioxide and humidity within the cluster.

It even seems that there is ignorance of the problem, being given the hypothesis which was formulated when, by 1993, he was noticed that feral colonies of bees prospered whereas the nearby domesticated colonies collapsed, infested with Varroa mites.

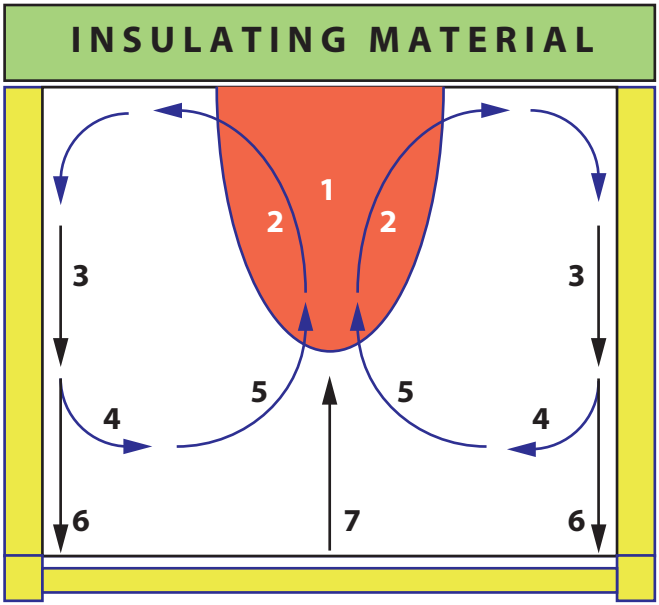
This hypothesis, classed by many as a definitive conclusion, seems known by beekeepers of the whole world or almost. It was given to me as explanation of the efficiency of the tubes board in all the countries where I had the opportunity to present it for soon twenty years: « Varroa mites fall and they cannot go back up any more «. Indeed, in the tree trunks where the feral colonies live, there is generally a big space under the cluster, what excludes any return of the parasite.

Nevertheless, another hypothesis should have been ventured: that of the ventilation of the colony. But since the beginning of beekeeping, it seems that the beekeepers never became aware of this necessity. What seemed important for the designers of the hives with mobile frames in the 19th century was the size of frames, their shape, their number. They were right, but the possibility which was given to the bees to renew at their convenience the atmosphere of the hive never appears in their concerns. The solid bottom board thus became the standard!

It is necessary to mention here Jean-Marie Gaillard, former president of the « Société Centrale d'Apiculture » in Paris. He was one of those who recommended a meshed opening in the bottom board, the dimensions of which he fixed to 30 cm x

CIRCULATION OF THE AIR IN WINTER IN A HIVE EQUIPPED WITH A SOLID FLOOR

(Assumptions according to the observations made on tubes and mesh floors)



1
Bees consume honey to warm up the brood and thus generate used, hot air, loaded with steam and carbon dioxide.

2
As it cannot be expelled by bees, this hot air evacuates upward the hive, generating an ascending flow.

3
In the contact of walls it cools.
The steam condenses then flows on the bottom.

4
The used air, cooled and drier, loaded with carbon dioxide comes down until a certain level where its density becomes equal to that of the outside air.

5
A part of the used air is then recycled in the ascending flow.

6
The rest of the used air continues to cool in contact with walls and gets out through the entrance.

7
It is replaced in equal quantity by fresh air.

30 cm. The drawbacks of the solid bottom board seemed to him indeed important in terms of healthiness of the colony.

The discovery of the healthy feral colonies gave birth to two types of bottom boards, both intended to eliminate definitively under the hive every Varroa mite falling from the cluster: the fully meshed board and the tubes board invented by Marcel Legris. Nevertheless, these two bottom boards are fundamentally different. The global opening of the tubes board is ten times smaller than the one of the mesh board. Besides, openings are situated under spaces inter-frames.

The mesh bottom board has quickly showed its ineffectiveness against Varroa mites but the ease of its manufacturing incited many beekeepers to equip themselves with it, which was in any case a progress with regard to the solid board.

The tubes bottom board was as for it, very difficult and expensive to make, at least in its first version, what dissuaded Marcel Legris to produce it and so blocked its distribution. Nevertheless, some users from the very beginning made interesting observations. First of all, the exchange of a mesh board with a tubes board in the beginning of autumn, when Varroa mites fall naturally, results in a very important and immediate increase of the falls. What can change in the hive in an instant to have such an effect?

Besides, around February, there is already much brood and the night temperatures can be very low. We notice then the presence of condensation on tubes under the brood. Nevertheless, he is in the minds that condensation occurs on the sides of the hive and that this water is found on the bottom that it is advised to incline forwards to eliminate it. Thus how come that condensation is found on tubes?

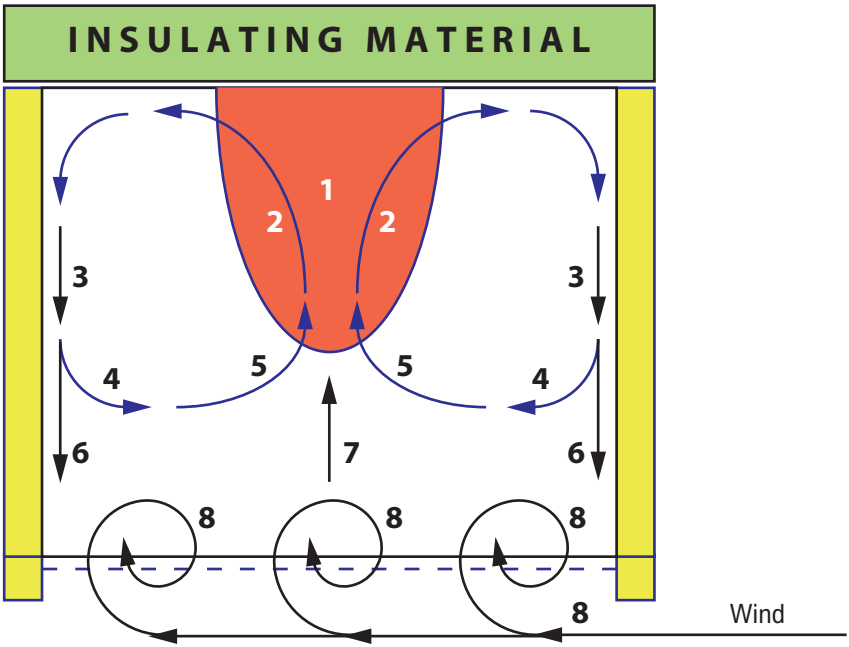
When the tubes board began to be diffused, it was common to consider the cluster of bees in winter as a sluggish object releasing heat.

This model seems likely in the case of a hive equipped with a solid bottom board. The used air, hot and containing much humidity and carbon dioxide rises of the cluster, condenses partially on top board if this one is not well isolated and ends cooling and condensing on the walls of the hive. The water of condensation ends its journey on the bottom whereas the remaining mixture of cooled air and carbon dioxide, heavier than air eliminates outside through the entrance.

With the tubes bottom board, the condensation on tubes under the cluster demonstrates that the cluster is not inert and that ventilating bees expel used air through the bottom. They can make it even by very cold weather because they are in a still relatively hot draught. The used air so passes between the tubes, condenses partially in the passage and scatters in the atmosphere exactly as ourselves when we expire. In equal volume, fresh air penetrates into the hive on the sides and so supplies the bees with oxygen necessary for the degradation of the honey consumed

CIRCULATION OF THE AIR IN WINTER IN A HIVE EQUIPPED WITH A FULL MESH FLOOR

(Assumptions according to the observations made on tubes and mesh floors)



1
Bees consume honey to warm up the brood and thus generate used, hot air, loaded with steam and carbon dioxide.
Bees cannot expel this hot air downward because it would go back up for the main part on sides.

2
This hot air evacuates upward the hive, generating an ascending flow.

3
In the contact of walls it cools.
The steam condenses then sinks towards the outside.

4
The used air, cooled and drier, loaded with carbon dioxide comes down until a certain level where its density becomes equal to that of the outside air.

5
A part of the used air is then recycled in the ascending flow.

6
The rest of the used air continues to cool in contact with walls and gets out through the mesh.

7
It is replaced in equal quantity by fresh air.

8
The wind causes whirlwinds raising in the hive and putting under stress bees all year round.
It's as though the low parts of the walls did not exist.

to maintain the right temperature around the brood.

Why bees could not in a similar way expel the used air through the entrance with a solid bottom board? It remains to explain but the facts demonstrate that it is not the case.

We could imagine on the other hand that this process takes place with the fully meshed bottom board. But it is likely that the excessive opening brings the expelled, still hot air and thus lighter than air, to go back up into the hive around the downward flow. Thus the condensation would finally take place on the walls of the hive, just like with the solid bottom board. Besides, the movements of outside air generate whirlwinds around the cluster, which is inevitably complementary source of discomfort for bees in winter as in summer.

This hypothesis which consists in associating with the tubes bottom board the possibility given to the bees to control the renewal of air in the hive, is in line with the increase of the falls of Varroa mites immediately after change of a mesh bottom board with a tubes bottom board. Because nothing else can change in the hive any minute set apart the atmosphere which it contains. The purification so obtained would return stronger bees to get rid of Varroa mites.

It remains to understand why the feral colonies prosper in highly infested environments. It could come because these bees are not strongly forced as in our hives, thus that they can build combs at their convenience and that the necessity of being able to ventilate effectively would so be taken into account. The atmosphere being so regulated by the bees themselves as in a hive equipped with the tubes bottom board, Varroa mites would be eliminated in the same way at the end of the summer.

- 2 -
VARROA MITES LIFE CYCLE WITH THE TUBES BOTTOM BOARD

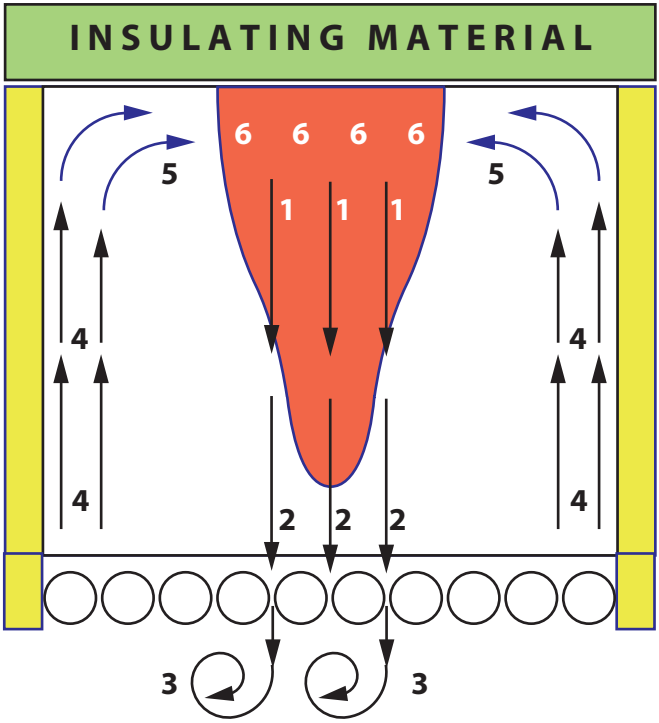
Varroa mites begin to get loose from the cluster by the beginning of September. With the tubes bottom board, they are eliminated for the main part two months later but the elimination continues in proportion to the remaining infestation up to the early spring. From April, there is not fall anymore and the populations begin then to increase again to reach their peaks in the end of August where the cycle begins again.

The important point is the level of infestation at the time of the spring visit in March. It is much under the limit of the 5%, below which treatments are useless.

However, two complementary elements are to be taken into account for the new users.

CIRCULATION OF THE AIR IN WINTER IN A HIVE EQUIPPED WITH A TUBES FLOOR

(Assumptions according to the observations made on tubes and mesh floors)



1
Bees consume honey to warm up the brood and thus generate used, hot air, loaded with steam and carbon dioxide.

2
Bees not being hampered by outside inconvenient airflow, expel this used air between tubes, under the hive, at their convenience.

3
The used air is then scattered in the ambient air as when we exhale. Condensation may appear on tubes, by cold weather.

4
Fresh air in equal quantity comes in on sides.

5
In the high part, it mixes with the ambient air to generate an atmosphere whose humidity and temperature are thus regulated by bees themselves.

6
Bees being so in an atmosphere well suited to their needs, fight better against Varroa and the diseases. They are also capable of raising more brood.

If the tubes bottom board is set up in spring, the population of Varroa mites is then rather important because the falls with another kind of bottom board will not have been sufficient during the bad season. In the months which follow, this population is going to multiply to generate at the end of the summer an infestation which can be very disturbing. It will be reduced to little in the months which follow but it is however possible that it had appreciably weakened the colony for the wintering.

It is thus preferable to install the tubes bottom board in autumn. The treatment of the previous spring will have limited the multiplication of mites which will be eliminated from the change of bottom board.

It is however necessary to take into account the fact that acarids and insects are similar bodies. A poison for the one is not without consequence for the other one. Precautions for use show that they are not even without consequence on the human beings. In other words, treatments also poison and weaken bees. This brings a reduced defense of bees against Varroa mites whose speed of re-infestation is so increased. In 1983, Ritter indicated that any treatment was useless below 5 % of infestation in spring. Today, it is the figure of 1 % that is moved forward on the various sites of beekeeping associations on the Internet.

Thus it is not surprising to notice a slightly too high infestation during the first year of use of the tubes bottom board. It can bring to observe some bees with atrophied wings at the foot of the hive during a beautiful spring day following a period of bad weather. But their number is absolutely unimportant with regard to the healthy workers. The hive is very populous at that time and this fact should not worry.

- 3 -
HOW TO CHECK THE INFESTATION?

The counting of the falls in autumn is a widely recommended method. It has the advantage to be simple but the way of making is not insignificant.

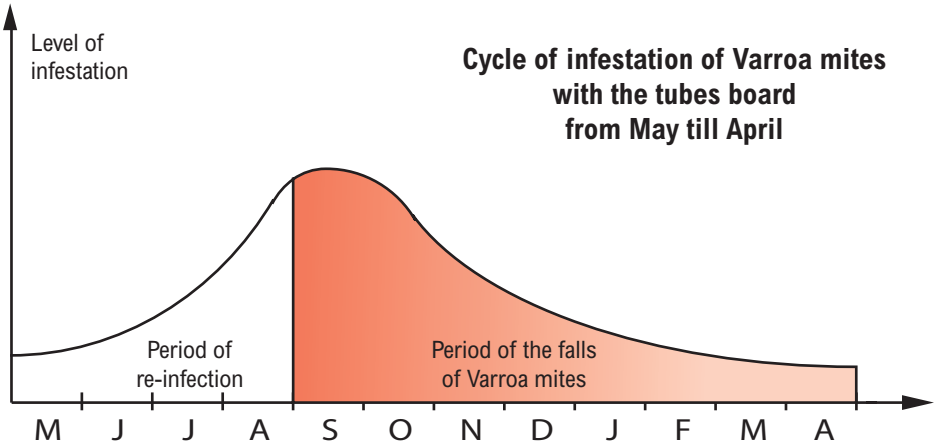
It is generally indicated placing on the bottom board a greased plate on which Varroa mites are trapped. But by making it, we transform the tubes bottom board into solid bottom board which distorts completely the results.

It is absolutely necessary to keep the aeration to make these countings. Thus the greased plate has to be situated at least 10 cm under the board. To convince oneself of it, it is enough to make a counting during a day with the first method then the following day with the second method.

Besides, the interpretations which we find on the Internet are valid for the mesh bottom board and doubtless for the solid bottom board but absolutely not for the

tubes bottom board which allows the bees to get rid much more efficiently of parasites. The figure which gives the relationship between the estimated value of the infestation and the number of falls a day must be thus revised very widely downwards.

But the most reliable method to measure the infestation is the bees washing. It is necessary to take some hundred bees from an open brood frame, to separate mites and bees with alcohol or better, with some icing sugar, to count mites and bees to determine the percentage of infestation. This method is widely described on the Internet.



Let us remind that during the trials made in the apiarian center of Vesoul (France), no correlation was found between the results stemming from the counting of the daily falls and those of this method. It remains to be confirmed but it is better to favor the latter.

- 4 -
HIVE STANDS

In order to make the tubes bottom board work, it is necessary it is heightened by at least 10 cm, but 20 cm are preferable, so that the used air expelled by the ventilating bees through the bottom board is scattered in the ambient air. If the hive is put on a plane surface, we have the equivalent of a solid bottom board with all its inconveniences.

Stands in thread of diameter 8 or 10 mm constitute a very good solution. But the wood slides easily on these stands. It is thus essential to fix under the bottom board two U shaped aluminum section into which will fit the high parts of the stand. These aluminum sections are easy to find and of moderate price.

This hive is set about 20 cm above the ground by means of a stand in thread, what allows the bees to expel the used air through the tubes bottom board. Waste and Varroa are collected on a slightly heightened glass sheet. At a glance, it is possible to estimate the state of development of the colony in winter (here at the end of December).
We can see U shaped sections which avoid the sliding of the hive on the threads.

Another solution consists in using two breeze blocks by hive. These blocks are 20 cm high for 50 cm long. They have practically the ideal dimension. We shall take simply the precaution to let them extend beyond a minimum inward.

- 5 -
CROWNBOARD

A transparent crownboard is very useful to visualize the state of the colony without disturbing bees.

There is good reason to choose a flexible and not breakable material. So the glass just like the metacrylate (Plexiglas and Altuglass trade marks) are absolutely to be banned. Clear PVC sheet, 1 mm in thickness, easy to cut and cheap is a first option. The polycarbonate, sold in particular under the name of Lexan is more resistant but more expensive. A 0,75 mm thickness is sufficient.

With a wooden frame, the plastic is remotely maintained from frames, what allows the passage of bees.

However, the low thickness of these plastics does not protect from the cold. It is then necessary to stack a good insulating material which can be found at the distributor's of beekeeping equipment. This insulation is correct when crownboard is hot in the touch in the presence of brood. This information is very useful when the winter continues, not allowing to make the spring visit.

Some people recommend to make small openings at the top of the hive to ventilate the hive by chimney effect. At times, this additional ventilation can be useful but it is probably not a good idea because this ventilation is permanent whatever the weather and whatever the needs for bees. There will be thus moments when this ventilation will be inconvenient without bees have the possibility of closing them. With the tubes bottom board, bees permanently control the atmosphere of the hive, any additional ventilation which they do not control does not seem wise.

- 6 -
SETTING UP SUPERS AND SWARMING

Maybe you were taught at the beekeeping school that we have to set up the first super when the brood body is full, which is indicated in particular by the presence of wax constructions on the top of frames. By acting in this way, you are certain more or less to activate an early swarming. Two points indeed go against this practice.

In the hive, bees do not fill a cell with nectar then pass to the following one, etc. To dry the nectar and transform it into honey, a large quantity of cells is required,

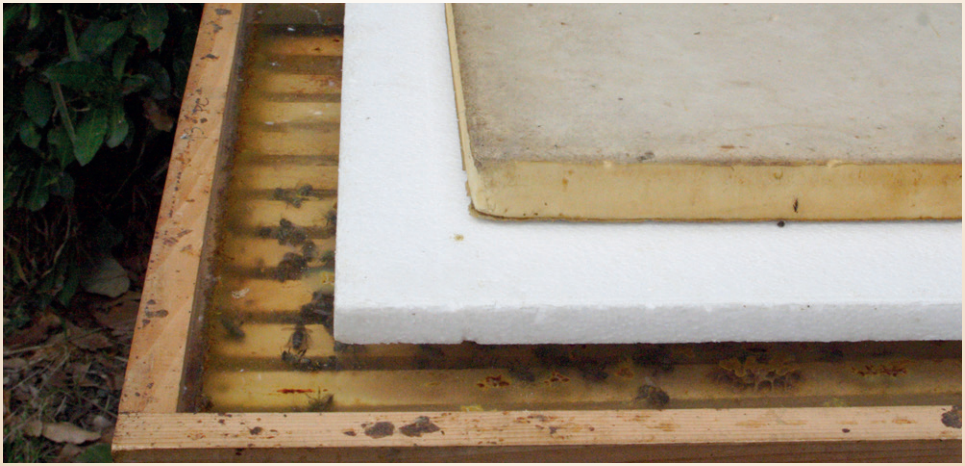
Transparent crownboard allows to get an idea of the state of the colony even when it freezes.

in which the nectar is put down in low thickness. It can then be efficiently dried by ventilation. If bees have not the quantity of cells which they need, they will be more inclined to swarm.

Besides, during the trials which were conducted in the apiarian centers of Vesoul and Toulouse, surfaces of brood much more important than with the mesh board were observed. Practically twice more in March in Vesoul and still 25% more in May in Toulouse. Colonies are thus much stronger which also increases the probability of swarming.

It is then advised to set up the first super as soon as the hive begins to gain weight. In this way, bees are never forced by the lack of room and swarming is considerably delayed if not avoided.

Some can be afraid that an excessive volume provided to the bees can cool them. It is to forget that bees are very efficient to protect themselves from



A first thickness of insulating material fits in the frame whereas another thicker one strengthens the insulation.

the cold and that heat losses do not depend on the volume of the hive but on its outside surface. The 25 mm thickness of wooden walls gets a good insulation, the crownboard gets still better one. Thus there is nothing to be afraid of. Besides, colonies are already populous at that time and little sensitive to cold.

Nevertheless, if the colony swarms, there will be already two or three supers on the hive in normal year. With the tubes board, swarming does not mean zero harvest.

It is however important to prevent any secondary swarming. If you have caught the swarm, then install it at the place of the origin hive which will thus be moved. All the foraging bees will so strengthen the swarm which will become rather strong to receive the supers. The origin colony is very weakened for a moment and it will not swarm any more. But as it contains much brood, it will be reconstituted very quickly. We so obtain two strong colonies early in the season instead of one. It is of course quite possible to make this operation artificially before swarming.

- 7 -
THE MAINTENANCE OF THE BOTTOM BOARD

The tubes bottom board is the board we install and forget, pointed out one of the first users.

And actually, it remains clean during several years. It happens that the beekeeper is surprised during the spring visit, the cleanliness being the one of a new board.

There is never septic waste as on the solid board where the waste of the winter gets mixed with condensation water making a culture broth harmful to the health of bees.

It may be drops of propolis lost by foraging bees and which give a false impression of dirt. It is not the case of the majority of colonies.

But bees do not like angles. They fill them with a small amount of propolis which goes on between tubes with years. After 4 or 5 years, spaces are reduced by a centimeter from every spacer. It is not prejudicial to the proper functioning of the board but a cold water jet with the garden hose eliminates it. Nothing really sticks on the polyethylene of tubes and spacers.

Let us remind that polyethylene is a plastic widely used in the food industry. It is with its close relative, the polypropylene, the archetypal food plastic. Containing only carbon and hydrogen, it emits no poison gas. It's the same when it is eliminated by combustion.

- 8 -
THE ADDITIONAL POSITIVE POINTS

Most of the solid boards were designed to be reversible. On one side, the height of the entrance was reduced and on the other side it could make a few centimeters. During the bad season, the entrance of the hive was rather small to keep the colony warm, as if it was a sluggish object not needing to breathe. During the apiarian season, on the contrary, the big entrance was chosen, maybe to facilitate the traffic of the bees, maybe to allow more ventilation, the nectar having to be dried up.

All this no longer serves any purpose with the tubes bottom board. Bees, just like the human beings, naturally need to breathe in winter as in summer and the tubes bottom board allows them all year round to eliminate the used air at their convenience. From then on, the entrance of the hive is not more of use than to the passage of bees. It can be limited to 8 mm in height which eliminates any risk of robbing in summer. It was noticed that cappings let to be licked against the rules a few meters away from the apiary does not start robbing. The guards are not overwhelmed by an excessive opening and they so have the capacity to block efficiently the way to the robbing bees.

The 8 mm high entrance is enough for the passage of bees and can be effectively kept against the robbing bees.

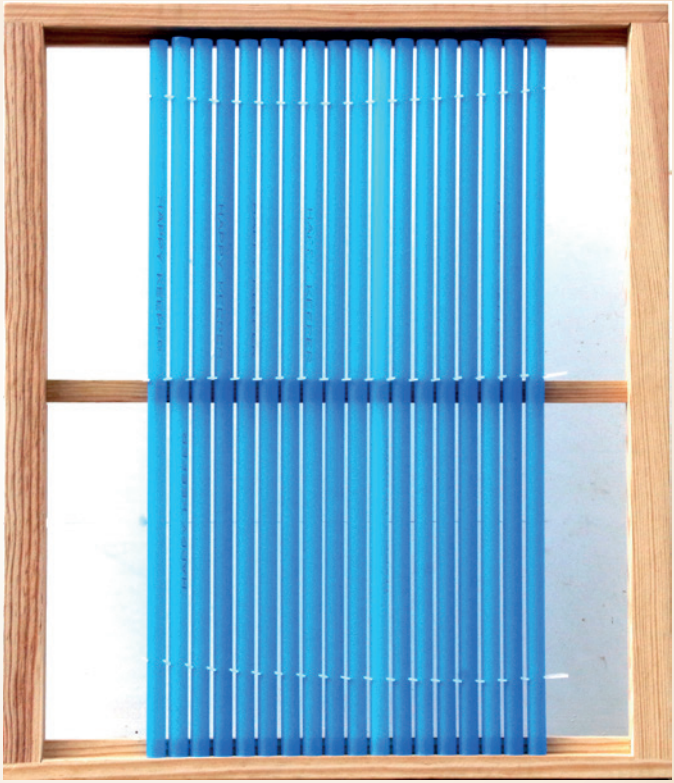
You will never see either a bee beard, even though the hive is very populated. The ventilation facilitated by the tubes board allows the bees to maintain a comfortable atmosphere even when outside temperature is hot.

- 9 -
HARVESTING PROPOLIS

The Happykeeper propolis screen is made of polyethylene tubes about 12 mm diameter and maintained spaced 2 mm apart. Bees fill the openings with propolis.

This screen can be inserted into a wooden frame and placed above the frames or suspended to a top bar of a frame and placed at a side in the brood body. Between 30 and 40g of propolis can be harvested in either case, according to the colony of bees and also the weather.

Bees don't like openings that are too small for them when they don't have access to the other side. They close them with propolis or often with wax when the first is missing.



Incorporated into a frame, the propolis screen takes place on the top of hive.

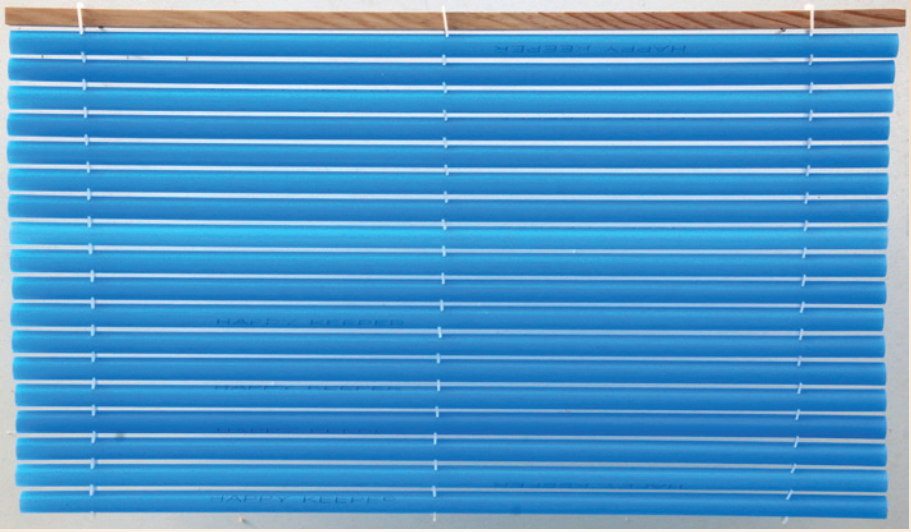
This is why Happykeeper propolis sheets are designed to give bees access to both sides. They are then in no hurry to fill the gaps and when they lack propolis, they do not put wax: they wait.

Happykeeper propolis sheets give a very high-quality propolis because it is almost pure.

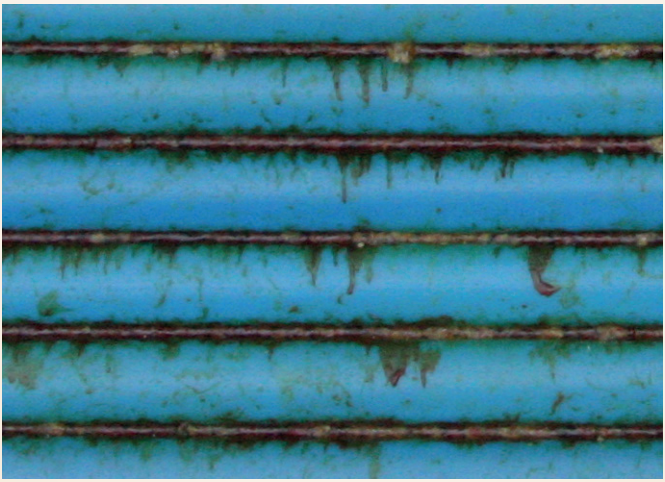
Harvesting is made without preliminary passage in the refrigerator. A temperature lower than 20 °C suits. You just have to cross an object such as a knife between the tubes, in the opposite direction of the sharp edge, so that the propolis gets loose.

We so obtain a propolis of high quality, treasure for the health, not polluted by anti-Varroa treatments and which can be kept as is in the refrigerator mainly against agglomeration.

Taken as is with a little water, at the rate of 1g, 3 or 4 times a day, it can quickly control the minor illnesses, but terribly annoying, such as the flu. There are many other uses, described in specialized works.



This propolis screen hangs on simply to a top bar of a frame and is placed on either side of the brood body.



Bees fill both sides of the tubes, which represents a substantial quantity of propolis. This one gets loose at room temperature by means of a fine object.