

# The Highland Pollen Trap

Simply harvest pure pollen







## Imprint

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*Photo 1: Front page - daily harvest in July at the pollen apiary Donau Au, Eferding.*

Photo credit: All photos are by the author unless otherwise indicated.

For reasons of better readability, the simultaneous use of the linguistic forms male, female and diverse (m/f/d) is dispensed with. All personal designations apply equally to all genders.



*Dedicated to*

*Matthias*

*my friend and companion*



## 1 Thoughts

Pollen is a symbol of fertility. It is what makes plant life possible in the first place. Bees and other insects, the wind and birds carry it from flower to flower to the germ cells of our life.

Day after day, pollen shows you the individuality of your colonies. Single bee colonies are absolute individualists. If they previously ignored the blue pollen that everyone else brought in, they later collect a pale yellow pollen, while the majority switch to greengrey pollen. Collecting pollen thus becomes a fascinating and always new experience.

The colourfulness of the pollen loads from spring to summer outshines any rainbow. We beekeepers are given the gift of discovering in the pollen the diversity of a plant world that often remains hidden even from the attentive hiker.

Collecting pollen is poetry.

Collecting pollen is experienced magic, hidden in the harmony of flowers and bees.

Collecting pollen is a revelation,  
a gateway to this million-year-old secret  
that has made our honeybees so successful.



*Photo 2: Red pollen of the gipsy rose*



*Photo 3: Colourfulness in June.*

## 2 About this manual

A long-standing dream was to collect colourful pollen with the help of bees. Matthias built the first pollen trap according to my design in 2005. 15 years later, I adapted the design. After many further revisions and optimisations, I succeeded in achieving the goals I had set. With the Highland Pollen Trap, largely pure pollen can be harvested with little effort.

To arouse interest and curiosity are the intentions of this handbook. Written from practical experience, in the middle of the pollen collecting and honey harvesting season.

With many pictures and detailed records, insight is given into the functioning of the Highland Pollen Trap and the work steps during the pollen collection season. The explanations are naturally influenced by the regions of the Danube plain and the highlands of the Mühlviertel, where our bees fly in selected locations. Strict guidelines are avoided, on the one hand they are not necessary, on the other hand the individual way of working should be able to flow into the pollen collection branch of the business.

The experiences and recommendations for pollen collection are based exclusively on this Highland Pollen Trap made by the Böhmerwaldwerkstatt. New developments live from the diversity of its users. The author is happy to receive constructive suggestions.

In the course of time, many small, often unapparent details have gone into the construction of the Highland Pollen Trap. The knowledge of this was handed over to the Böhmerwaldwerkstatt.

May this handbook be the occasion to discover the colourful and fascinating world of flower pollen in all its diversity and experience it with all your senses!



*Photo 4: Pollen apiary Danube Au near Eferding.*



### 3 Targets

No matter who you talk to, collecting pollen is very labour-intensive, mainly due to the time-consuming cleaning process. Most beekeepers who produce pollen in large quantities use a pollen trap that is inserted into the high floor board of the hive. Typically, everything that falls from the colony falls into the collected pollen. This can be considerable amounts, especially after certain steps in the course of colony management. These include cutting out the drone combs, expanding the brood chamber and placing honey supers, which are usually filled with spun-out combs.

Pollen traps placed outside, in front of the entrances, have not been able to assert themselves under our Central European weather conditions. In heavy rainfall, especially in heavy thunderstorms, where gusts of wind often drive the water masses almost horizontally against the pollen traps and let them run down the hive wall, soaking of the pollen is unavoidable. The pollen is unsaleable and cleaning the pollen traps is time-consuming and hardly feasible at the apiary. The pollen traps are usually difficult to fix because we do not have standardised hives. The bees are very irritated at the beginning because of the strong change of the entrance front. With this type of construction, all colonies of a apiary should always be equipped with pollen traps in order to prevent the bees from flying away to neighbouring colonies with the "usual" flight front.

In order to build up sustainable pollen production and integrate it as easily as possible into the current honey operation, a pollen trap must fulfil the following targets for us:

- Harvesting pollen that is as pure as possible
- Minimal cleaning effort
- Pollen collection without bee contact
- Minimisation of the workload
- Simple activation and deactivation of the pollen trap
- No disturbance of the ongoing bee flight
- Retention of the usual hive management
- Protection from heavy rain

During the current pollen harvest season at various locations with different pollen origins, the need for optimisation became apparent again and again. Today we can say: With the Highland Pollen Trap presented here, we have achieved these goals for our apiary.

## 4 Construction of the Highland Pollen Trap

The Highland Pollen Trap is designed as an independent floor board under the bee colony. At the beginning of the pollen harvesting season, the existing floor board is replaced by the pollen trap. It remains under the colony until the end of the pollen season.

The components of the Highland Pollen Trap are:

- pollen floor board
- dirty tray
- pollen collection tray
- pollen grid
- drone escapes
- stainless steel grid
- cover plate
- free flight entrance
- entrance to the pollen trap
- entrance block
- Plate for the hive number



*Photo 5: The Highland Pollen Trap.*

The Hochland Pollen Trap is precisely matched to the dimensions of the hives used in the apiary. It is painted on the outside with the same colour as the hives. This means that there is no flight to colonies without pollen traps after the trap has been placed underneath.

The stainless steel grid has a mesh size of 3.15 mm and a wire thickness of 0.56 mm.

The pollen grid of the Highland Pollen Trap manufactured for our company has the dimensions 390 x 40 mm. If necessary, the length can be shortened. The pollen grid should always be made of plastic. It is gentler the bees. Pollen grids made of metal are often more aggressive, not dimensionally stable and therefore not recommended.

A small plate for the hive number is screwed onto the dirty tray. We use offcuts of an aluminium composite plate for this. The hive number is written on this with a waterproof felt-tip pen (e.g. edding permanent marker) when the hive floor board is exchanged for the pollen trap. The inscription can be wiped off again with ethyl acetate (acetic acid ethyl ester) dripped onto a cloth. Nail varnish removers are also suitable, whether they contain acetone or not. Pure petrol, such as lighter fluid, does not work.

Other utensils that are used with us:

Pollen box: 2 mm perforated box for the transport of pollen. Stackable, with dimensions of 50 x 34 x 12 cm and a capacity of up to 7 kg, made of food-grade plastic.



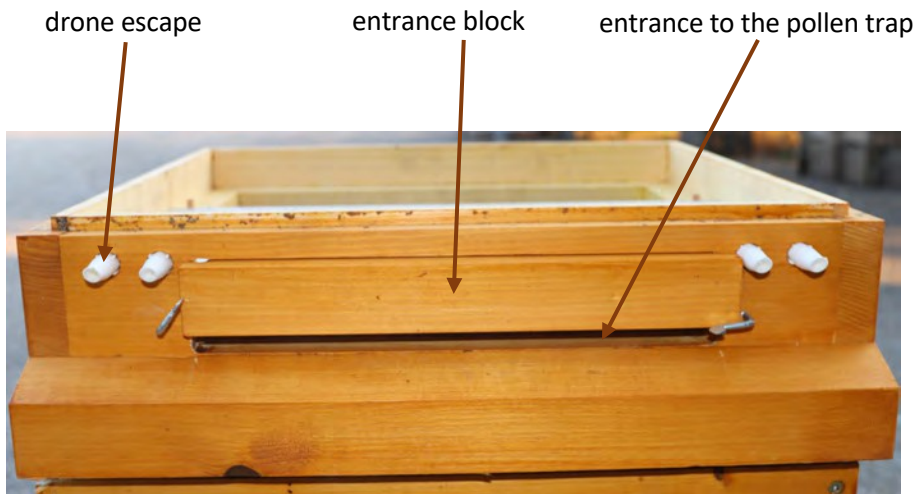


Photo 7: Flight hole front of the Highland Pollen Trap.



Photo 8: Plate for hive number. Screwed to the pollen tray. Wipeable.

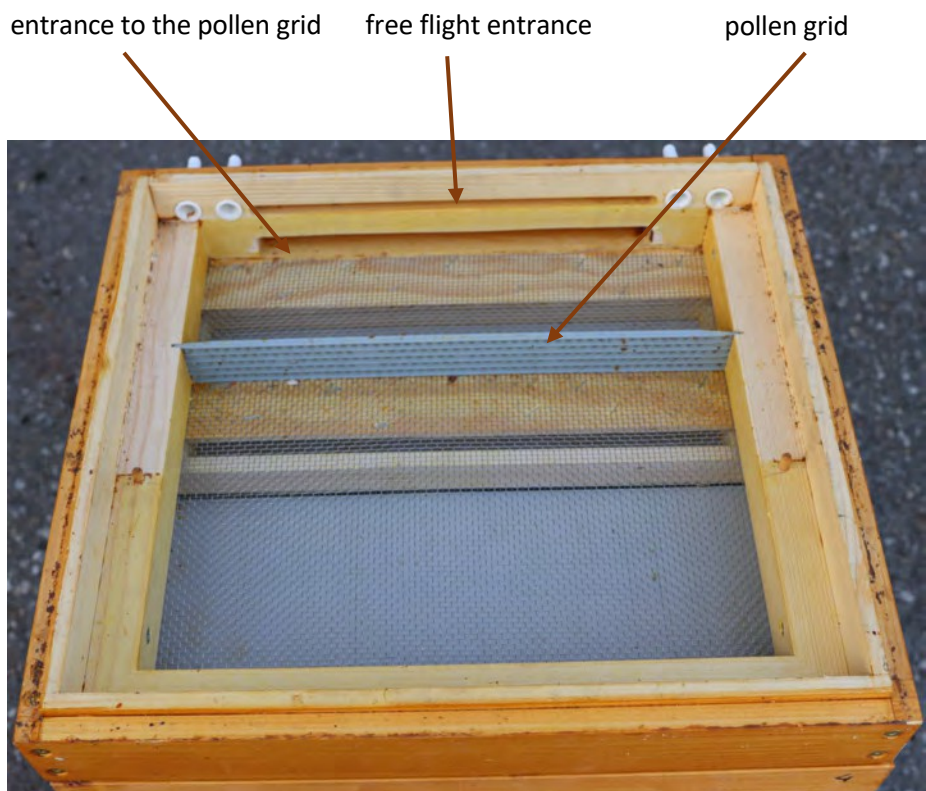


Photo 9: Interior view of the Highland Pollen Trap.



cover plate    pollen trap body    pollen collection tray    dirty tray



*Photo 10: Highland Pollen Trap with the crucial components.*

Drone escapes specially made for pollen traps are available from a supplier in Valencia ([latiendadelapicultor.com](http://latiendadelapicultor.com)). They have a bevelled exit opening, the inner wall is grooved for a better grip for the bees.



*Photo 11: Special drone escapes for pollen traps from La Tienda del Apicultor.*

## 5 Setting the Highland Pollen Trap

Step-by-step description of setting the Highland Pollen Trap. Here on 28 April.



*Photo 12: The two brood chambers are lifted off and placed behind them on empty boxes at a manageable height. Photo: Theresa Frühwirth.*



*Photo 13: After removing the floor board, the Highland Pollen Trap is placed in its place. Photo: Theresa Frühwirth.*





*Photo 14: Placed Highland Pollen Trap. At the beginning, the free flight entrance is always opened. Photo: Theresa Frühwirth*



*Photo 15: If combs has been built at the lower brood chamber, they will be removed. Photo: Theresa Frühwirth.*



*Photo 16: The bees are driven into the hive with smoke. Photo: Theresa Frühwirth.*



*Photo 17: The second brood chamber is then put back in place. Photo: Theresa Frühwirth.*





*Photo 18: The apiary has been converted to pollen collection. Initially, the free flight entrance is always open. The pollen trap is thus deactivated.*



*Photo 19: All the Highland Pollen Traps have been active for 4 weeks. Here on 25 May.*

## 6 Work with the colonies

We are working with flat Hoffman frames and a high floor board. In the 40 years of development of the apiary, it has come about that our frame size is now the “German standard size flat” (Deutschnormalmaß flach), with 12 frames per box. This corresponds to about ten “Zander flat”.

The hives are on fixed locations at 260 metres above sea level (Donau Au) and at 550 to 650 metres above sea level (Mühlviertel). We have no migratory beekeeping, as we are not technically equipped to do so.

The Highland Pollen Trap is suitable for all modes of operation and hive designs. Its dimensions are based only on the dimensions and construction of the supers.

During the entire time that the pollen trap is placed as a floor under the brood chamber, the colonies are managed as usual. The colonies are kept in two brood chambers. Only in individual cases, with very strong colonies and early swarming mood, a third box is placed underneath. The building frames are cut out and the honey supers are put on or taken off. In the case of colonies which, in spite of everything, come into swarming mood, a `sucker` is created over the queen excluder.

Since we set up the honey supers with the combs spun out, the bees grind off the frayed cell edges. The wax crumbs fall down into the dirty tray. Only a few wax crumbs remain in the pollen tray on the first day. By the next day, this has disappeared.



*Photo 20: Removal of pollen on the day after setting up the honey super. Optimal separation of stripped pollen and rubbish. Photo: Theresa Frühwirth.*



*Photo 21: The dirty tray collects all of the screened wax from the honey super. Photo: Theresa Frühwirth.*





*Photo 22: The pollen tray contains the almost pure pollen. Photo: Theresa Frühwirth.*

Since there is a low free space above the rear area of the dirty tray, the bees can build a two to three centimetre high wild comb there. This is removed on occasion.

In the drone season and with the stronger colonies, accumulations of drones can often be observed in the entrance area when the pollen trap is activated. This has no further significance for the operation and function of the pollen trap. There is no displacement of the pollen grid. The drones sit in front of the entrance or on the floor of the antechamber in front of the pollen grid.



*Photo 23: Clusters of drones can form in front of the entrance. No influence on the effectiveness of the pollen collection result was found.*

## 7 The pollen harvest-season

Daily harvests volumes are highest in spring. It is best to set the pollen traps according to phenological dates. We usually start at the time of the main blossom of the cherry, when the dandelion also begins to blossom and the honey supers has not yet been set up. If pollen traps are placed underneath later, the wild drone combs may have to be removed.

From then on, the Highland Pollen Trap remains under the bee colonies until about mid-July. The pollen trap can be easily activated and deactivated by moving the entrance block. Before varroa treatment, the pollen traps are removed and exchanged for the normal floor board.

The colour spectrum of the collected pollen is strongly determined by the collection area and the flowering plants found there. In April and May, we usually have a picture that is strongly characterised by yellow and beige to brown, with some green. In mid-May, dark wine-red spots of horse chestnut and isolated orange pollen appear. There are always surprises. Towards the end of May, beautiful dark-blue pollen loads can appear from one day to the next, and in large quantities. Then a Phacelia (scorpionweed) that was cultivated in early spring is flowering somewhere, or it has overwintered as a small plant in a field in the undergrowth.

In June, when the flowering in the landscape, which is easily visible to us, has subsided, the daily harvest quantities become smaller. However, the colourfulness increases impressively. Bright orange, mixed with dark grey, often dominates our landscape. In mixed arable and grassland areas, the intense orange can also be combined with a light beigegrey when ribwort plantain and cornflower are in flower. From the end of June, the cornflower clearly dominates here in the Mühlviertel at 600 metres above sea level and in July the colour green determines the pollen pellets. So every season and every region has its very own and typical beautiful colour combination.

From mid-July onwards, the daily pollen quantities harvested by us drop to a level that no longer makes economic sense. The pollen trap is deactivated and replaced with the floor board at the next opportunity.

If you are lucky enough to be in large areas of flowering Phacelia (scorpionweed) at the end of July, then you should consider leaving the pollen traps under the colonies or putting them under again to be able to harvest this fantastically beautiful pollen. Large quantities of pollen accumulate here. If you decide for the former, the pollen tray should be removed from the dirty tray during the Varroa treatment (and the pollen trap should be deactivated).

In any case, emptying the pollen trays is always an experience, every day can bring a new surprise. The pollen harvest is also fascinating because it allows us to experience how the bee colonies of the same apiary search for pollen individually. Usually it is only individual colonies that discover a new pollen source. With each passing day, a certain colour shines out of the pollen tray of other colonies. Similarly, a colony may completely ignore a pollen crop that is flown by all other colonies.



This colony obviously gathers elsewhere and thus has a completely different and individual colour pattern in its pollen loads. There are also apparently distinct individualists among the bee colonies.



*Photo 24: This collection result and the three next photos all come from the same apiary. Taken on 25 May at the pollen apiary Donau Au near Eferding. Here hive no. 35.*



*Photo 25: Hive no. 175.*



*Photo 26: Hive no. 40.*



*Photo 27: Hive no. 112.*

## 8 Harvesting the pollen

The pollen trays are emptied in the late afternoon to evening, usually between 5 and 8 pm. If the apiaries are spread over several, more distant locations, it is also possible to start pollen collection earlier and work until dusk. In any case, visibility should still be good towards the evening.

In principle, daily emptying of the pollen trays is recommended. In warm, sunny and dry weather with an easterly wind, a two-day collection of pollen is also possible.

In special cases (in case of personal prevention, heavy rain, etc.) the pollen cups can be emptied after two days. In spring, however, a moisture content of 25 to 32 % is to be expected in cold, damp weather. This pollen should be put into the dryer immediately and with careful handling.



*Photo 28: Pollen removal is possible even in light rain. The pollen box is covered.*

If the bees are storing on the magazine wall in very hot and humid weather, the dirty tray should be closed while emptying the pollen tray. There are always bees that want to slip into the dirty tray from behind.

Colonies of equal strength can also differ considerably in pollen yield, as is the case with honey yield. Presumably there is also a genetic predisposition in the expression of pollen collection performance.

Colonies in swarming mood, or even colonies that have swarmed out, strongly decrease their pollen collection. Colonies with a conspicuously low pollen count are checked at the next opportunity.

When emptying the pollen trays, a special perforated pollen box serves us as a transport box for the pollen pellets. A handy stainless steel spatula (edge width approx. 8 cm) helps when emptying.

If the pollen tray is not full, the pollen is carefully poured into the pollen box from the slanted pollen tray with the spatula. If the pollen tray is full of pollen, it is simply emptied into the pollen box.

This perforated pollen box has proven itself to us. It is wider than the pollen tray so that no pollen is lost sideways. It can be stacked and thus enables safe transport. The perforations ventilate the pollen, so it does not stick to the ground even during longer trips.

The pollen tray is carefully cleaned or scraped out with the spatula after each removal. Tip: Hold the spatula as steeply as possible and scrape the plate of the pollen tray with strong pressure. The dirty tray should only be cleaned with the spatula every second or third day. However, scraping out the dirty tray then becomes considerably more timeconsuming because the pollen that has fallen into the dirty tray can also dry on. In very cool and damp weather, it can be useful to clean the dirty tray every time it is removed.

Activation of the pollen trap after a longer break:

1. Clean the dirty tray and pollen tray with a spatula (scrape out) before activation.
2. By deactivating the pollen trap, some drones are usually locked in the antechamber. After the activation entrance block has been inserted from the pollen entrance into the upper free flight entrance, the antechamber should be carefully cleaned out with a wooden stick.
3. On the first collection day after the reopening of the pollen entrance, slightly more contamination in the pollen tray is to be expected. On the second collection day, everything has returned to normal and the level of contamination in the pollen tray is again at the usual, very low level.

The risk of mould formation is most pronounced in very hot, humid weather with higher humidity. The location also has an influence (locations in or on the edge of larger riparian forests are more at risk). In this weather, it is best to empty the pollen tray every day. In cold, rainy weather, as can be the case in May, the risk of mould is somewhat lower. If the pollen is removed daily, there is no risk of mould.

In July, when temperatures remain high, the Greater Wax Moth can sometimes be attracted to the collected pollen and sneak into the pollen tray during longer collection intervals (3 days). It can be easily recognised by its web at the edge of the pollen tray. The pollen pellets are conspicuously clumped together there. When the pollen is collected, care is taken that this gossamer does not enter the pollen box. Normally it remains on the wall of the pollen tray.





*Photo 29: If pollen is only removed after three days, the Greater Wax Moth can occasionally get into the pollen tray at very high temperatures (July).*



*Photo 30: The larva of the Greater Wax Moth is in the web. This can be removed easily. The other pollen is not affected.*



*Photo 31: On some days in May, the pollen tray can almost overflow.*



*Photo 32: On such days, more than 4 kg of fresh pollen can be harvested from 15 colonies.*



*Photo 33: If several pollen apiaries are harvested, the pollen box can be stacked well if you want to harvest separately by location.*





*Photo 34: The almost complete separation of the pollen from the waste from the colony is clearly visible. 20 June. See also photo no. 35.*

The very good separation of pollen and contamination from the colony (wax crumbs after putting on the honey supers) is ensured. Pollen harvesting and cleaning is fun!



*Photo 35: Contaminants in the daily harvest of 20 June with 1,020 grams of dried pollen.*

## 9 Drying

The moisture content of the fresh pollen is influenced by the weather during the collection phase (day and night) and - according to our experience so far - also by the location. Cool to cold weather with rain and high humidity can cause the moisture content to rise to over 30 %. In dry, sunny weather with an east wind, on the other hand, it can be as low as 15 %.

Sites in more extensive floodplains (Danube floodplain) usually have a higher humidity than sites at higher altitudes, such as in the Mühlviertel. This also seems to influence pollen moisture. Thus, the site in the Danube floodplain always has a somewhat higher moisture content, although it is fully sunny from morning until late afternoon.

The degree of filling of the space under the queen escluder also plays a role. If the brood chamber, which in the case of flat frames is two boxes, is full of bees and these are very saggy, this is optimal for a lower pollen moisture. If in the swarming period a third brood chamber was pushed underneath colonies at risk of swarming, the tendency to swarm was dissolved, but the bees usually no longer incubate this lowest box down to the bottombar of the frames. The pollen of these colonies often (but not always) shows a slightly higher moisture content. Especially in cool, rainy weather in May, some condensation can form in the dirty tray (not in the pollen tray!) under the pollen tray in such colonies. Then the dirty tray is wiped dry with an absorbent cotton cloth (tea towel) in the course of removal and cleaning.

The freshly harvested pollen is placed in the drying unit in the evening after the return.

Drying temperature: 35 to maximum 40 °C. The air must be actively moved through or over the inserted trays with a ventilation fan. During pollen drying, the air in the room is dried with a dehumidifier. In our company, the CDT 30 MKIII dehumidifier from Dantherm is used. The drying time is 6 to 10 hours, depending on the bulk height and moisture content of the pollen.

The target is 5 to max. 7 % residual moisture. Products containing oil and protein must not exceed 9 % residual moisture.

We dry with the DA 1000 dehydrator from Rommelsbacher, with 10 stainless steel drying trays (grids). The KY0420 drying pads are suitable for drying pollen. This dehydrator is comparatively inexpensive (approx. € 330.00 incl. VAT; Saturn Passau; April 2023). It can be used to dry up to 5 kg of fresh pollen in one load. If necessary, with this quantity and with very moist pollen, the pollen must be shaken or stirred from time to time during the drying process.

It is also worth considering whether it makes sense to work with several drying units such as the DA 1000 when dealing with somewhat larger quantities of pollen. On the one hand, this is still cheaper than a professional drying device, on the other hand, one is more flexible in adapting to the amount of pollen produced.

If pollen production is discontinued at a later stage, these smaller units are also easier to sell than large drying systems.

For regularly very large quantities of fresh pollen, an investment in larger pollen drying cabinets (e.g. from Lega) should be considered. These start at a price level of € 1,900.00 (incl. VAT; as of June 2023).

If very large quantities of pollen should ever accumulate, the fresh pollen that exceeds the drying capacity can also be frozen as an interim solution.



*Photo 36: A sufficient amount of fresh pollen is poured onto the drying base.*



*Photo 37: Afterwards, this heap is roughly spread over the whole surface with a spatula.*





*Photo 38: Short lateral shaking distributes the fresh pollen fairly evenly.*



*Photo 39: The dried pollen can be removed. It is usually cleaned immediately or, in some cases, stored in an airtight and dark place.*

## 10 Measurement of the pollen moisture

After removal from the drying unit, the question arises: How high is the water content? Has it been dried sufficiently or even too much? Ideally, the water content of pollen should not be higher than 7%. If the water content is too low, the pollen pellets will become hard and you will also lose some weight.

Determining the water content in dried pollen loads is not possible without a measuring device. It is possible to have the water content determined in a laboratory. This can be expensive for more frequent examinations. Laboratory analysis also does not offer the necessary flexibility and speed during the pollen harvest season.

As far as we know, the French company Samap écosystème is the only manufacturer worldwide to offer a moisture meter calibrated for pollen. The H40 moisture meter costs € 527.60 incl. VAT (as of July 2023), excluding shipping costs. Shipping costs to Austria are € 28.45 excl. VAT (as of June 2023).

Ordering online did not work for us because you have to specify a delivery zone in France in the order process. Therefore, contact the company via "Contact" and indicate your order in the contact form under "Your message". It is important to write the text in French. Further communication will also be in French. If necessary, use a translation aid such as DeepL to help you. The whole process works smoothly and reliably.

Source of supply: Samap écosystème, 68000 Colmar. <https://www.samap-eco.fr/>. Delivery is quick. The H40 meter is packed in a case.

An instruction manual in English is included. It is easy to understand and very helpful for the first introduction to the moisture measurement of flower pollen.



Photo 40: The H40 moisture meter in the storage box.



After the composition and adjustment of the device according to the description, the pollen loads are filled into the measuring device with the measuring cup.



*Photo 41: The H40 measuring device assembled. For measurement, the pollen is poured into the downwardly closed filling space under the lid.*

After opening the drop flaps, the water content of the pollen is immediately displayed on the display. The measurement is calibrated to an ambient temperature of 20 °C. For each degree above or below this, the displayed measured value must be corrected by - 0.1 or +0.1 (see operating instructions).



*Photo 42: After opening the drop flaps, the pollen falls down into the measuring chamber. The moisture content is immediately shown on the display. If the ambient temperature is other than 20°C, the displayed value must be corrected.*

After several measurements and checks by laboratory tests, it can be stated that the indicated moisture contents are very well usable for practice. Differences of one to two tenths of a percent are negligible.

Regarding the ambient temperature mentioned in the description, it should be noted: The temperature of the pollen is decisive. If the pollen was stored at exactly 20°C and is measured directly from the storage container without a longer stay at a different temperature, no correction of the displayed measured value is necessary. If the pollen has a temperature other than 20°C, for example because it was in a warmer room before the measurement, then the displayed measured value must be corrected accordingly.

Experiences and tips in the handling of H40:

1. Always fill the filling chamber to the brim with pollen and put the lid on tightly.
2. Only ever hold the meter at the top of the slightly funnel-shaped filling chamber when it is switched on. In other words, the switch at the front is in the ON position.
3. When opening the drop flaps and afterwards, never touch the bottom of the measuring unit or even come close to it with your hands. Always hold on to the top of the filling chamber! Otherwise the measuring result will be influenced.
4. For cleaning the measuring chamber we use a "Cleaning brush Rotilabo brush made of wool" (35 mm, 100 mm, 330 mm). Available in the Carl Roth webshop (<https://www.carlroth.com/at/de/>) under item number XK65.1. Price: € 8.60 excl. VAT (as of August 2023) plus shipping costs. This is better than a cloth at removing residual pollen and especially pollen dust from the measuring chamber. Switch off the device before cleaning!



*Photo 43: The wool cleaning brush is very good at removing pollen dust from the measuring chamber.*

## 11 Cleaning the pollen

The dried pollen is sifted on a white base and occasional impurities are removed with tweezers. The pollen is loosely distributed on the underlay with a scoop. After sifting, the support is gently shaken sideways once. Any remaining impurities that were not visible before become visible and can be removed. Good lighting of the work surface makes the work much easier.

Contaminants are, for example, legs, antennae, parts of the chitinous shell, wing (parts), ants, Varroa mites, propolis crumbs, wax flakes, beetles, poplar seeds, dust bags from the flowers, brood cell covers, wax parts. Both of the latter are usually found the day after work with the bee colony.

It is interesting that the pollen loads have a very different size and also differ greatly in shape. Some of the dried loads have a shape that no longer resembles the usual, rather round shape. Presumably these have been deformed when they were scraped off the pollen tray.

We do not use cleaning technology, which is available in great variety on the market. We only work with tweezers and that is enough. So far, we have not used a blower to blow out the pollen and the very light chitin parts.

Anyone who has sighted many kilograms of pollen will ask themselves how well or how accurately this technique can really work in practice. There are some impurities that are very similar in size, shape and weight to pollen loads. Legs, antennae, wings, parts of the chitinous carapace and ants will certainly be easy to separate from pollen using a blower. A blower can also be used to remove pollen dust. However, the setting of the wind force requires special care and must also be readjusted again and again. The composition of the collected pollen and the impurities changes constantly in the course of the collecting season. Even if pollen is collected in different regions at the same time, it often differs fundamentally in size and shape. Furthermore, the day after work on the bee colony, the type of contamination is different (wax particles). This should also be taken into account when setting up the equipment. In any case, a blower is required to remove pollen dust and abrasion from the pollen pellets.

According to our experience, it takes between 50 and 70 minutes to manually clean 1 kg of dried pollen. This can serve as an orientation value for the time needed to clean pollen from the Highland Pollen Trap. Experience also plays a certain role, because over time the eye becomes more practised in quickly recognising certain smaller impurities. In addition, on some days the pollen is particularly pure. With an average time of 60 minutes for cleaning 1 kg of dry pollen, the entire workload of the Highland Pollen Trap is covered.



If the daily incoming quantities are too large to be able to clean them continuously after drying, the dried pollen is stored in an airtight container so that it can be inspected later for impurities as required.

Also common are broken-off parts of pollen loads, especially the tips of pollen loads, which are found in some types of pollen or are formed by some bees. These and the fine pollen dust present are not removed. Pollen dust is on the one hand scraped off by the bees and on the other hand, to a lesser extent, it is also produced by abrasion during manipulation. It remains with us in the pollen loads.



*Photo 44: Cleaning workplace; clockwise from left to right: bowl for impurities; dry pollen loads spread on white underlay; bowl with impure pollen and bowl with cleaned pollen.*



*Photo 45: Contamination in 607 grams of dry pollen from photo 43 above; from 7 July.*



Photo 46: 2-day harvest of a colony from 26 and 27 June.



Photo 47: Total harvest at the pollen apiary Danube Au on 26 and 27 June. 2,281 g fresh mass; 1,824 g dry pollen.



Photo 48: Contamination in the 1,824 grams of dry pollen from the 26 and 27 June.



## 12 Cleaning the Highland Pollen Trap

After the end of the pollen season, the pollen traps are usually stored temporarily, because urgent work such as removing the honey supers and Varroa control are still pending.

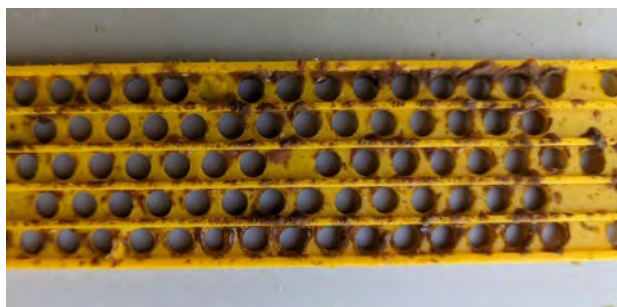


*Photo 49: After removal, the Highland Pollen Traps are temporarily stored on pallets until cleaning.*

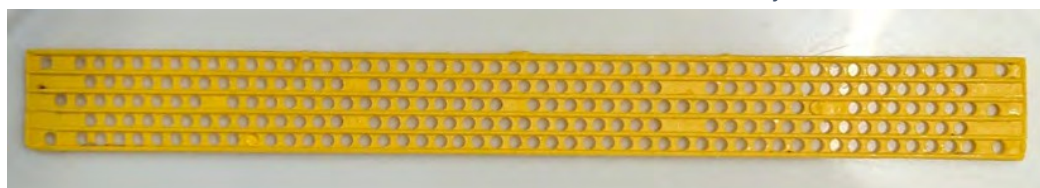
The pollen traps are stored on a pallet in such a way that the dirty trays can be pulled out on both sides. The pollen still inside must be removed roughly, otherwise mould can form.

Before they are finally put into winter storage, the pollen traps are cleaned as carefully as possible. All parts to be cleaned can be easily removed.

Pollen grid: During a prolonged collection period, the bees have stripped propolis from the openings of the pollen grid. These deposits can be dissolved by soaking in a 2% sodium hydroxide solution or in a diluted sodium hydroxide-based disinfectant cleaner, such as TM Ergopur (for wineries and food processing plants).



*Photo 50: Propolis accumulated on the pollen grid must be removed.*

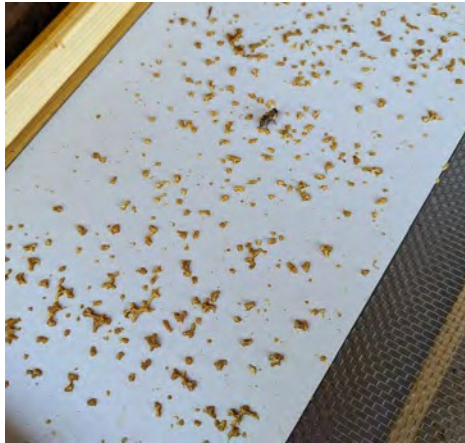


*Photo 51: Pollen grid after cleaning with diluted disinfectant cleaner.*



The floor panels and the corners and angles of the pollen tray and dirty tray must be cleaned. We use a sponge cloth (e.g. Wettex) soaked in one of the cleaning agents mentioned above. This also removes the grey coating that has sometimes formed.

Cover plate: The wax superstructures must be scraped off so that no wax moths can settle in the store later.

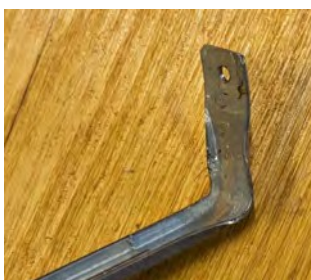


*Photo 52: After more than 2 months of pollen trapping under the bee colony, wax superstructures are found on the cover plate. These are removed with a spatula.*

The compartment for the dirty tray should not be overlooked. Inside the front, dirt and pollen that has fallen down while emptying the pollen cups can accumulate over the course of the pollen season. We have bent a metal rod to make this area very easy to clean.



*Photo 53: Linkage for cleaning the dirty tray compartment.*



*Photo 54: The curved end of the boom is flat and right-angled. This makes it easy to clean the corners that are difficult to reach.*



*Photo 55: With this cleaning linkage, even the remote corners can be reached.*

## 13 Influence on the behaviour of the colonies

The harvesting of the pollen has a certain influence on the behaviour of the bee colony. This is often overestimated in the supply of pollen and in a good honey flow. Cooling at very high temperatures is more complex. The beekeeper can take this into account.

### 13.1 Pollen supply

In the literature, it is often mentioned that pollen collection stops the pollen supply of the bee colony and that the colony suffers from pollen deficiency. However, Christine Russmann from Molln has never observed this in her many years of experience collecting pollen. We have also never been able to detect a lack of pollen in our colonies.

There was always enough pollen stored around the brood nest. We did not notice the numerous pollen combs that often appear in May. Even 12 weeks of continuous pollen harvest are no problem for the colonies.

As an indication of the secure pollen supply, we see the numerous pollen loads, which can be seen regularly in the garbage zone of the dirty tray even when the pollen trap is activated.



*Photo 56: Numerous pollen loads in the dirty tray of the activated Highland Pollen Trap are a sign of the secured pollen supply; 8 July.*

Even in June, when the pollen supply - depending on the region - can be somewhat lower than in May, the colonies are sufficiently supplied with pollen.



*Photo 57: Pollen combs from mid-May are a sign of a sufficiently guaranteed pollen supply for the colonies.*

With the Highland Pollen Trap, the pollen supply of the colony is in any case sufficiently guaranteed. This should also be the case with other designs that are integrated into the floor board. With time, one gets a feeling for the ratio of the filling level of the pollen tray (daily harvest) and the number of pollen pellets in the dirty tray. This ratio is a good indicator for the pollen supply of the bee colony. If the pollen tray is full for three or four days in a row and there are hardly any pellets in the dirty tray, then the pollen trap should be deactivated. This has not happened to us yet.

### 13.2 Nectar and honeydew input

It is often said that the pollen trap should be removed at the beginning of a good honey flow. Arguments put forward include the sticking of the collected pollen by the honey sac content, which is released by the bees through the pollen trap when they hatch.

So far we have not been able to observe this with the Highland Pollen Trap. Even with a full flight into the flowering season in spring or with a honeydew flow in June with more than 3 kg daily weight gain, there are no impairments due to the honey sacs content.

The allegedly lower honey yield of colonies with pollen traps is also a topic in beekeepers' discussions. The reason for this is said to be the lack of pollen in the colony, which causes the bee colony to switch more bees from nectar and honeydew to pollen collection.



The Highland Pollen Trap does not influence the amount of nectar or honey dew in any way. With daily precise recording of the collected pollen quantities over months, we could not find any connection with the increases and decreases in the hive scale colonies in any direction. Rather, pollen yield and honey yield are determined by the availability of honey flows as well as the weather, the colony strength and the mood of the colony (e.g. swarming tendency).

See item 19.2 Annex II: Documentation of harvest quantities, moisture content, weather and balance stick results.

In the coming years, we will closely monitor the relationship between pollen input and scale-hive data on several apiaries in different regions.



*Photo 58: Nice end of the pollen harvest season with 2,052 grams of fresh pollen and 1,737 grams of dried pollen from 13 colonies after three hot days in mid-July.*

### 13.3 Ventilation

The bee colonies should be shaded in summer and placed rather sunny in winter, that is an old beekeeper's rule.

But you do not always have this possibility. If the location is in full sun all day and the temperature is above 30°C, if the pollen trap is set underneath, especially in very strong colonies, there may be a somewhat stronger presence in front of the entrance or on the hive wall. This calms down again when it cools down during the night or after the thunderstorm front has passed.

So far, we have not been able to determine any negative influences on the pollen gathering behaviour and on the harvested pollen yield. With increasing pollen offer, pollen yields also increase under such conditions.

In any case, the beekeeper should be aware that the pollen trap makes ventilation somewhat more difficult.



*Photo 59: 34°C temperature at 6pm. Very humid weather. With very strong colonies the bees sit outside in apiaries that are exposed to the sun all day.*

## 14 Analyses

The pollen comes directly from the flowering plants in the region around the bee colonies. It is thus exposed to all environmental influences. Likewise, the plant species can be responsible for certain ingredients. It is advisable to take a look at this.

### 14.1 Pyrrolizidine alkaloids

Pyrrolizidine alkaloids (PA) are plant constituents that can damage health, especially the liver, after ingestion. They are therefore undesirable in food and feed. So far, PAs have been detected in about 350 plant species worldwide. They are most frequently found in the families of the Asteraceae (aster family), Boraginaceae (borage family) and Fabaceae (legume family). Pyrrolizidine alkaloid-forming plants native to Austria are, for example, representatives of the genus Greiskraut (synonym: ragwort; Jacob's ragwort, common ragwort, grove ragwort), coltsfoot and butterbur from the composite family, viper's bugloss, borage and comfrey from the borage family (AGES 2023).

For "Pollen-based food supplements, pollen and pollen products", the maximum content of 500µg/kg has applied since 1 July 2020 according to the EU Regulation. The maximum content applies to the food supplements as they are marketed (AGES 2023).

According to a publication of the European Food Safety Authority Agency EFSA ("Risks for human health related to the presence of pyrrolizidine alkaloids in honey, tea, herbal infusions and food supplements". 27 July 2017, EFSA Journal 2017; 15(7): 4908), the maximum daily intake is 0.0237 µg PA/kg body weight (MOE<sup>1</sup>). This maximum daily intake includes a 10,000-fold safety margin. The German Federal Institute for Risk Assessment (BfR) recommends that a daily intake of 0.0237 µg per kg body weight (corresponds to 1.42 µg/day at 60 kg body weight) should not be exceeded (Von der Ohe, 2020).

Body weight in kg	max. daily intake in µg
60	1,42
70	1,66
80	1,9

*Table 1: Maximum daily intake of pyrrolizidine alkaloids in µg depending on body weight.*

---

<sup>1</sup> MOE values are not health-based limit values, but serve to prioritise measures for risk management, such as the control of food within the framework of official food monitoring (Bundesinstitut für Risikobewertung, 2018).



For pollen with the permitted maximum content of 500 µg/kg, the following daily pollen amounts should not be exceeded:

Body weight in kg	60	70	80	90
max. daily amount of PA (µg)	1,42	1,66	1,9	2,13
Max. daily amount of pollen (grams)	2,84	3,32	3,8	4,26

Table 2: Maximum daily intake of pollen with the permitted maximum content of 500 µg pyrrolizidine alkaloids, depending on body weight.

With lower PA levels, the maximum daily amount of pollen that can be eaten increases accordingly.

One heaped teaspoon corresponds to 5 grams of pollen. Depending on the type of spoon and the size and shape of the pollen, the amount of pollen is between 4.4 and 5.7 grams. From 50 weighings, an average value of 5.05 g was determined (Wimmer, 2023).

Since the recommended daily pollen consumption is given as approx. 5-10 g, corresponding food supplements with a high pollen content from PA plants are likely to have high PA contamination and should therefore be regarded as critical and not fit for consumption. Every beekeeper who collects pollen should be aware of this problem (Von der Ohe, 2020).

Example of a PA analysis result of a June pollen from the Donau Au, carried out by FoodQS:

Analyt	Destination-limit µg/kg	Result µg/kg
1 I Europin	1	< BG
1 I Europin-N-oxide	10	< BG
1 I Heliotrin	1	< BG
1 I Heliotrin N-oxide	10	< BG
1 I Lycopsamine N-oxide type [3]	10	< BG
1 I Lycopsamine type [1]	1	< BG
2 I Echimidine	1	< BG
2 I Echimidine N-oxide	10	< BG
2 I Lasiocarpine	1	< BG
2 I Lasiocarpine N-oxide	10	< BG
3 I Erucifolin	1	< BG
3 I Erucifolin-N-oxide	10	< BG
3 I Monocrotaline	1	< BG
3 I Monocrotaline N-oxide	10	< BG
3 I Retrorsin	1	< BG
3 I Retrorsine N-oxide	10	< BG
3 I Senecionin N-oxide type [4]	10	< BG
3 I Senecionin type [2]	1	4
3 I Seneciophylline	1	< BG
3 I Seneciophylline N-oxide	10	< BG
3 I Senkirkin	1	< BG
3 I Trichodesmin	1	< BG
1 I Sum of the monoester PAs		< BG
2 I Sum of the open-chain diesters PAs		< BG
3 I Sum of the cyclic diesters PAs		4
<b>Sum of all PAs</b>		<b>4</b>

Table 3: Example of a PA analysis result of a June pollen from the Danube Au, carried out by FoodQS.

Labs are for example:

FoodQS GmbH, Mühlsteig 15, D-90579 Langenzenn.  
www.foodqs.de; e-mail: info@foodqs.de.

OÖ. Labor für Bienenprodukte: Pachmayrstraße 57, A-4040 Linz;  
<https://www.imkereizentrum.at/de/labor/leistungen/leistungen-detail/news.qualitaetssiegel.html>; e-mail: labor@imkereizentrum.at.

## 14.2 Residues

However, several studies (e.g. DeBiMo) have shown that pollen collected by bees is often highly contaminated with residues of various active substances. The extent of contamination is usually considerably higher in pollen than in honey, both in terms of the number of detectable active substances and their concentration. This is mainly due to the fact that pollen is not processed by the bees to the same extent as honey and therefore potentially existing contaminants are not reduced. The intensity of PPP contamination in pollen is directly related to the intensity of the need to treat the surrounding agricultural crops with plant protection products. However, after amendment of Annex 1 of Regulation (EC) 396/2005 by Regulation (EU) 2018/62, the maximum residue limits in beekeeping products were retroactively limited to honey as of 01.01.2018. Accordingly, there are currently no maximum residue limits for plant protection products in pollen (but there are for bee medicines such as acaricides or similar) (Schierling, 2020).

Commission Regulation (EU) 2018/62 of 17 January 2018 replacing Annex I to Regulation (EC) No 396/2005 of the European Parliament and of the Council states in point (5): "A new footnote 7 should be added to Part A of Annex I to Regulation (EC) No 396/2005 to clarify that the MRLs of honey do not apply to other apiculture products due to different chemical characteristics". Footnote 7 in Annex I reads: 'MRLs shall not apply to other apiculture products until products are specified and listed in this group'.

In summary, it can be stated that the analysed pollen samples contained various contaminants of different relevance. As no maximum residue limits for pesticides in pollen are currently specified and no direct health risks to consumers were to be expected from the measured active ingredient contents, the detected pesticides did not lead to a loss of marketability of the pollen. In the case of pollen batches that are heavily contaminated with pesticides - but toxicologically harmless - marketing is permissible, but by no means advisable. If residue analyses are carried out by e.g. NGOs (Stiftung Warentest, Ökotest etc.), high pesticide contents could jeopardise the positive image of bee products among consumers. In principle, it is recommended to follow strategies for minimising residues as much as possible. For example, the risk of pesticide residues can be reduced by optimising the location (less intensive agriculture in the surrounding area) (Schierling, A. 2020).

From our own experience and from our own studies, higher residue levels of fungicides are to be expected especially in regions with intensive vegetable and fruit cultivation, as well as in areas with quality cereal cultivation (wheat, barley, triticale). In regions with predominantly grassland or grassland and fodder cereals, there are usually no or only very few and also very low residue levels in pollen.

Various laboratories offer residue analyses. It is recommended to always have your pollen analysed using the multi-screening method. This method covers more than 500 active substances. This gives a complete overview of the residue situation.

Labs are for example:

FoodQS GmbH, Mühlsteig 15, D-90579 Langenzenn. [www.foodqs.de](http://www.foodqs.de). [info@foodqs.de](mailto:info@foodqs.de).

Institut Dr. Wagner, Parkring 2, A-8403 Lebring-St. Margarethen.  
[www.institut-wagner.at](http://www.institut-wagner.at). [labor@institut-wagner.at](mailto:labor@institut-wagner.at).

Laboratory for Bee Products and Health (OÖ. Labor für Bienenprodukte):  
Pachmayrstraße 57, A- 4040 Linz; <https://www.imkereizentrum.at/de/labor/leistungen/leistungen-detail/news.qualitaetsiegel.html>; [labor@imkereizentrum.at](mailto:labor@imkereizentrum.at).

### 14.3 Plant species - Botanical Origin

Every trip to the pollen apiaries is exciting. What colours of pollen are shining out at you today? What is happening out there in the landscape? Over time, you get to know your bee colonies. It is almost always the same colonies where new colours are in the pollen tray for the first time.

It takes a lot of experience to be able to assign the different colours to individual plant groups. Especially in spring, the shades of yellow differ only in nuances, which are also difficult to describe in words.

For discussions with customers, it is advantageous to know from which plants the pollen loads originates. An "orientating pollen analysis" is very suitable for this. It gives a good overview of the visited plant families and partly also plant species.

In regions with a relatively equal supply of flowers throughout the year, it is recommended to invest in this pollen analysis as basic information. For longer collection periods of 4 weeks or more, a mixed sample of the pollen collected so far should be compiled every 14 days. This will give you a good and meaningful information about the composition of your pollen at that time of the year. This will also behave similarly in the following years.

In arable areas, where the crops grown often differ fundamentally from year to year, there is no getting around an up-to-date orienting pollen analysis if you want to know which plant species are really represented in the pollen loads.



The Upper Austrian Honey Lab from the Upper Austrian Beekeeping Association offers this orienting pollen analysis. The costs are € 119.00. As this analysis is eligible for subsidies, the beekeeper has to pay € 20.00 himself (as of July 2023; eligible for subsidies for Austrian beekeepers). Sample quantity: 100 grams.

The orientating pollen analysis of the Upper Austrian Honey Lab includes: Guide pollen analysis, orienting screening (identification and listing of pollen types, without indication of count or percentage values).

Contact:

Laboratory for Bee Products and Health (Upper Austrian Honey Laboratory)  
Pachmayrstraße 57, A-4040 Linz <https://www.imkereizentrum.at/de/labor/leistungen.html>



*Photo 60: The modest colours of the highlands of the Mühlviertel. The pollen is all the more valuable for that: Cornflower, ribwort, white clover. Falkenstein, July.*



*Photo 61: Under the microscope the whole beauty of the pollen loads is revealed. An eldorado for determining the botanical origin. Donau Au, July.*

## 15 The Böhmerwaldwerkstatt

The Hochland Pollen Trap is a custom-made product, adapted to the super dimensions and to the construction of the supers of the apiary. We have developed it in close cooperation with the Böhmerwaldwerkstatt and continuously optimised it. The Highland Pollen Trap presented and described here is very successfully in use with us today with 70 units.

In the Böhmerwaldwerkstatt, they have experience with custom-made and dimensionally accurate products for beekeeping. The design is very well thought-out and includes small but important details that have emerged from practical experience in the course of development. We can highly recommend the Böhmerwaldwerkstatt for the Highland Pollen Trap. The components pollen grid, stainless steel grid and drone escapes are to be provided.

Please contact project manager Andreas Miesbauer, telephone: 0043 (0)7281 8010; email address: miesbauer@alom.at.

The Böhmerwaldwerkstatt has existed since 1989 and was founded with the aim of supporting people who have been unemployed for a long time to re-enter the world of work. In this way, people who have few opportunities on the labour market or mothers who are just leaving childcare and want to return to working life are given the opportunity of a gentle re-entry into the primary labour market.

In the carpentry, Tobias Scheiblberger, who himself has experience in beekeeping, is your contact person and the guarantor for the exact execution of the work.

ALOM Böhmerwaldwerkstatt  
Dreisesselbergstraße 1  
A-4160 Aigen-Schlägl  
[www.boehmerwaldwerkstatt.at](http://www.boehmerwaldwerkstatt.at)



*Photo 62: Tobias Scheiblhofer with the CNC-milled front of the Highland Pollen Trap.*

## 16 spurbiene.at - that's where I come from

Knowing where the food comes from, where it was produced, enables the consumer to identify with the food, with the region and with the producer. The product emerges from anonymity, it shows itself, it invites the consumer to get to know itself better.

With the application "spurenbiene.at" we enable our customers to explore the origin of honey and flower pollen, the collection region and the characteristics. All the way to the apiary where the bees collected.

Even before purchase, the QR code on the label can be scanned with a mobile phone and is taken directly to spurbiene.at. This is how we try to implement regionality and transparency in an easily comprehensible way.



*Photo 63: Lid label on the honey jar of the The Highland Beekeepers.*

Customers should know that our bees are "looking for the best nectar":

"In the morning, the scout bees fly out - in search of the best nectar and honey dew sources. Back home in the hive, they do their bee dance on the combs. This way, the other bees know where there are good things to collect so that the combs fill up again with valuable honey. Do it like our scout bees. Enter the batch number from the label of our highland honey above and we will guide you to the region of origin of this honey.

Knowing where your honey comes from gives you security. Discover the collection area of your honey!"






Photo 64: Proof of origin "spurbienen.at" for honey and pollen of The Highland Beekeepers.

After entering the batch number from the label on the start page of spurbiene.at, the customer is taken to information about the apiary and the properties of their honey.

## Die Lage "Rannatal"

Die Schluchtwälder des Naturschutzgebietes Rannatal bieten unseren Bienen ein reichhaltiges



Dort wo Uhu, Salamander und seltene Flechten und Moose zu Hause sind, finden unsere Bienen eine vielfältige und sehr naturbelassene Flora zum Sammeln. Ahorn, Faulbaum, Wildkirschen, Winterlinden, Himbeeren und Brombeeren, sowie Fichten und Tannen in den Mischwäldern der Rannaschlucht, füllen die Waben mit dunklem Waldhonig und hocharomatischem Sommerblütenhonig.

Nach der Schleuderung wurde der Honig auf seine Qualitätseigenschaften untersucht:

### Honigeigenschaften

<b>Wassergehalt</b>	17,0%
<b>Leitfähigkeit</b>	934 $\mu\text{Scm}^{-1}$
<b>pH</b>	4,2
<b>Enzymaktivität</b>	194 $\text{S}_\text{E}$ Invertase

### Sensorik

Honigtauhonig von säuerlich-würzigem Aroma.





Figure 2: Detailed information on spurbiene.at about the origin and properties of honey from the beekeeping farm "The Highland Beekeepers".


In the case of pollen, we describe the apiary, give a brief note on its use and show the location of the apiary.

## Die Pollen-Lage "Biohof Achleitner"


Am Rande großer Auwälder und inmitten der Bioflächen des bekannten Biohofs Achleitner liegt unser jüngster Bienenstand.



Bio-Bienen auf dem Bio-Gemüsebetrieb Achleitner. Was kann es besseres geben. Vom Frühjahr weg, wenn die Weiden, die Wildkirschen und die Traubenkirschen blühen, bis hinein in den Spätsommer, mit seinem Blütenmeer von Springkraut und Goldrute, fühlen sich hier unsere Bienen ausgesprochen wohl.



Der Pollenreichtum der Blütenflora wird eifrig genutzt. Gerade im Sommer ist ein gutes Pollenangebot wichtig für die Gesundheit unserer Bienen.



Die Farbenpracht des Blütenpollens ist ein Spiegelbild der blühenden Pflanzen im Flugkreis unserer Bienen. Jede Jahreszeit hat ihr ganz spezielles Farbenspektrum. Dieser Pollen wird vom dunkel blau-violetten Pollen der Phacelia geprägt.

### Sensorik

Blütenpollen schmeckt blumig-süß, je nach Jahreszeit auch leicht nussig bis mild herb. Ein Spiegelbild unserer Natur und der Jahreszeiten! Blütenpollen verfeinern Joghurt, Obstsalate und Joghurt. Auch als Farbtupfer auf grünen Salaten sind sie ein wahrer Blickfang. Blütenpollen enthält wertvolles Eiweiß, Fette, Vitamine und Spurenelemente. Verzehrempfehlung: Täglich einen gehäuften Teelöffel Blütenpollen pur (gut gekaut), oder als hochwertige Verfeinerung eurer Speisen.




Figure 3: Detailed information on [spurbienen.at](http://spurbienen.at) about the origin of the pollen and description of the location of the pollen apiary.



## 17 Composition of the pollen loads

The following important legal information should be given at the outset: In Austria, honey and wax are legally considered foodstuffs, while pollen, propolis and royal jelly are classified as food supplements. Therefore, the provisions of the LMSVG and the Food Supplements Regulation are binding. Beekeepers are not permitted to make healthrelated or disease-preventing claims, recommendations, etc. Only the doctor is allowed to diagnose, treat and make the appropriate recommendations.

What is contained in flower pollen?

- 20 % various reducing sugars
- 22 % Proteins
- 12 % Amino acids, of which 21 out of 22 are essential, i.e. vital, amino acids that must be supplied to the human body through food, as it cannot produce them itself.
- Pollen contains a wide range of minerals and trace elements such as:
  - 2 - 4 % Potassium
  - 1 - 2 % Magnesium
  - 1 - 1.5 % Calcium
  - 1 - 2 % Iron
  - 0.2 - 1 % Silicon
  - 1 - 1.5 % Phosphorus
  - and in small quantities sulphur, manganese, chlorine.

The pollen also contains:

- almost all vitamins (B 1 to B 12, C, D, E, K and Provitamin A),
- a nutritionally dreamy fatty acid pattern, with alpha-linoleic acid dominating,
- the enzymes phosphatase, amylase, saccharase, rutin as well as antibiotic substances and hormones.

All these ingredients play an important role in the cellular processes in the human body.

(The above text is taken from Apitherapie.at: <https://www.apitherapie.at/index.php/bienenprodukte-heilwirkung/bluetenpollen>)

The Bavarian State Institute for Viticulture and Horticulture - Specialist Centre for Bees (Bayerische Landesanstalt für Weinbau und Gartenbau - Fachzentrum für Bienen) (2004) gives the following ingredients:

- Protein between 11 and 35 %, including all the essential amino acids required by humans.
- Fats between 1 and 20 %, partly in droplet form or as a thin layer on the surface, mostly polyunsaturated fatty acids
- Carbohydrates,
  - hand collected: between 1 and 37 %
  - eyed: between 20 and 48
- Ash content: 0.9 to 8%
- Potassium, phosphorus, magnesium, iron, calcium, silicon, manganese, sulphur, chlorine, copper
- Water content of fresh pollen: 20 to 30 %.
- Active ingredients: enzymes that break down sugar, protein, fat (partly from the bee: brood-food glands; partly from plants).
- Attractants: flavourings, colourings



*Photo 65: Pollen - a delight for the eye, a refreshment for body and soul!*

## 18 Nutritional values for pollen

It is important to know that the nutritional values for pollen loads depend on its botanical origin. They can therefore be subject to considerable fluctuations and should only ever be seen as orientation values.

The data from the Austrian Nutritional Value Table (dato Denkwerkzeuge, 2021) show that the following nutrients are found in 100 grams of flower pollen (selection):

- 17.7 gram protein
- 4.2 grams of minerals with 7 different minerals, especially calcium (1000 mg), potassium (2000 mg) and phosphorus (1000 mg)
- 2.4 grams of monounsaturated fatty acids and 0.9 grams of polyunsaturated fatty acids. Of which about 15 mg omega-3 fatty acids and 908 mg omega-6 fatty acids.
- 11 vitamins, especially vitamin B3, vitamin C and vitamin K
- 20 amino acids; Approximately 8,400 mg essential amino acids and 9,200 mg non-essential amino acids.

Flower pollen is a food supplement. As the name suggests, its ingredients supplement the food that humans eat. Pollen can in no way replace a balanced, healthy diet adapted to nutritional needs. For people with a particularly high need for the substances it contains, pollen is a way of supplementing them from a natural source.

Pollen collected by bees can cause allergies. Patients with known pollen allergies (hay fever) should exercise caution. Pollen from composite plants (e.g. dandelion, sunflower) is considered particularly problematic (Münstedt and Hoffmann, 2018).

There is one known case in which a patient who took a blood-clotting medication experienced an increase in the blood-clotting effect. Accordingly, caution is recommended when taking pollen and anticoagulant medication at the same time (Münstedt and Hoffmann, 2018). A prior clarification with the attending physician is recommended.

In various publications, bee products in general and flower pollen in particular are said to have healing effects, which in very many cases lack any scientific basis. They take advantage of the doubts about classical medicine, which are all too often deliberately stirred up in order to promote certain products, according to the motto: nature is healthy and contains the real "natural" healing power.

If you want to deal with the subject of bee products and health in a serious way, the book "Bienenprodukte in der Medizin" (Bee Products in Medicine) by Münstedt and Hoffmann from Shaker Verlag is highly recommended. In it you will find a very balanced evaluation of apitherapy according to scientific criteria.



Münstedt and Hoffmann (2018) provide an overview of the vitamins and minerals contained in pollen, their daily requirements and the amount of pollen that would be needed to meet these requirements.

Component	Amount (µg/g)	DRD (mg)	Menge um Tagesbedarf zu decken (g)	Good sources
Retinol - Vitamin A	10-200	1	5-100	Cheese, eggs, apricots, yellow fruits
Thiamin - Vitamin B1	6-13	1-2	150	Wholemeal
Riboflavin - Vitamin B2	6-20	1,5-1,7	100	Dairy products, eggs
Pantothensäure - Vitamin B5	5-20	6	600	Yeast, wholemeal, egg yolk, broccoli, mushroom
Pyridoxin - Vitamin B6	2-7	1,5-2,5	500	Wholemeal
Ascorbinsäure - Vitamin C	70-560	50-100	500	Cabbage, spinach, peppers, broccoli, fruits
Cholecalciferol - Vitamin D	0,2-0,6	5-60	50.000	Dairy products, egg yolk, fish
Tocopherol - Vitamin E	40-320	6-12	100	Vegetable oil, grain, nuts
Biotin - Vitamin H	0,5-0,7	0,03-0,2	500	Egg yolk, soy, peas, carrots
Phytomenadion - Vitamin K	Spuren	1500	∞	Spinach, Sauerkraut, kale
Folsäure	3-10	0,15-0,3	50	Spinach, beetroot, asparagus
Niacin	40-110	10-20	50	Wholemeal, mushrooms, potatoes, meat

Table 4: Vitamin content of pollen, daily requirement and the amount of pollen that would be needed to meet the requirement. Presentation of good sources for the vitamins. Münstedt and Hoffmann, 2018.

Component	Amount (µg/g)	DRD (mg)	Menge um Tagesbedarf zu decken (g)	Good sources
Kalzium - Ca	200-300	800-1200	1000	Dairy products, kale
Kupfer - Cu	2-16	2	1000	Wholemeal, cherries, legumes, poultry, nuts
Eisen - Fe	11-170	10-15	100	Whole grains, pulses, Vegetables, apricots
Kalium - K	4000-20000	2000	200	Potatoes, vegetables, whole grains, pulses
Magnesium - Mg	200-3000	300-400	100	Potatoes, vegetables, whole grains, pulses
Mangan - Mn	20-110	2	50	Whole grains, legumes, blueberries, fruits, tea
Zink - Zn	30-250	15	100	Whole grains, dairy products, meat

Table 5: Mineral content of pollen, daily requirement and the amount of pollen that would be needed to meet the requirement. Presentation of good sources for the vitamins. Münstedt and Hoffmann, 2018.

Nutritional values for 100 grams:

Source for the following tables: dato Denkwerkzeuge (2021) Nährwerttabellen Lebensmittel (<https://nutritional-software.at/content/nuts-service/naehrwert-suche/>)

<b>LMIV long</b>	Quantity	Unit
Energy according to LMIV	392,0	kcal
Calorific value according to LMIV	1.656,2	kJ
Fat	6,9	g
- saturated fatty acids	2,3	g
- Monounsaturated fatty acids	2,4	g
- Polyunsaturated fatty acids	0,9	g
Carbohydrates	63,6	g
- Sugar	26,0	g
- Total sugar alcohols	0,0	g
- Starch	23.600,0	mg
Dietary fibre	2,4	g
Protein	17,7	g
Salt (calculated from sodium)	0,0	g
Mineral content	4,2	g

Table 6: Table of nutritional values of pollen according to LMIV. Source: dato Denkwerkzeuge, 2021.

<b>Vitamins</b>	Quantity	Unit
Vitamin A - Carotene	0,1	mg
Vitamin B2 - Riboflavin	0,1	mg
Vitamin B3 - Niacin, Nicotinic acid	0,5	mg
Vitamin B3 - Niacin equivalent	4,4	mg
Vitamin B5 - pantothenic acid	0,0	mg
Vitamin B6 - Pyridoxine	0,4	mg
Vitamin B9 - total folic acid	160,0	µg
Vitamin C - Ascorbic acid	25,7	mg
Vitamin E -tocopherol equivalents	9,2	mg
Vitamin E - Tocopherols	9,2	mg
Vitamin K - phylloquinone	17,5	µg

Table 7: Table of nutritional values of vitamins in pollen; source: dato Denkwerkzeuge, 2021.

<b>Minerals</b>	Quantity	Unit
Calcium	1.000,0	mg
Chlorine	72,6	mg
Potassium	2.000,0	mg
Magnesium	100,0	mg
Sodium	10,0	mg
Phosphorus	1.000,0	mg
Sulphur	30,7	mg

Table 8: Table of nutritional values of minerals in pollen; source: dato Denkwerkzeuge, 2021.

<b>Trace elements</b>	Quantity	Unit
Copper	0,8	mg
Fluorine	0,1	mg
Iron	2,0	mg
Iodine	1,9	µg
Manganese	0,6	mg
Zinc	0,7	mg

Table 9: Trace element nutrition table in pollen; source: dato Denkwerkzeuge, 2021.

<b>Dietary fibre</b>	Quantity	Unit
Cellulose	822,5	mg
Poly-hexoses	470,0	mg
Lignin	70,5	mg
Water insoluble dietary fibre	1.645,0	mg
Poly-pentoses	352,5	mg
Poly-uronic acid	634,5	mg
Water soluble dietary fibre	705,0	mg

Table 10: Nutritional table of dietary fibres in pollen; source: dato Denkwerkzeuge, 2021.

<b>Amino acids</b>	Quantity	Unit
Alanine	1.152,9	mg
Arginine	942,1	mg
Aspartic acid	2.311,4	mg
Cystine	238,1	mg
Essential amino acids	8.439,5	mg
Glutamic acid	3.491,6	mg
Glycine	656,8	mg
Uric acid	8,7	mg
Histidine	348,9	mg
Isoleucine	923,3	mg
Leucine	1.390,9	mg
Lysine	1.151,2	mg
Methionine	283,5	mg
non-essential amino acids	9.260,5	mg
Purine-N	2,9	mg
Phenylalanine	712,5	mg
Proline	937,0	mg
Serine	710,8	mg
Threonine	813,1	mg
Tryptophan	233,0	mg
Tyrosine	464,2	mg
Valine	938,7	mg

Table 11: Table of nutritional values of amino acids in pollen; source: dato Denkwerkzeuge, 2021.



<b>Fatty acids</b>	<b>Quantity</b>	<b>Unit</b>
Lauric acid	115,3	mg
Myristic acid	224,5	mg
Palmitic acid	1.857,0	mg
Palmitoleic acid	121,5	mg
Stearic acid	103,2	mg
Oleic acid	2.234,0	mg
Linoleic acid	0,9	g
Glycerine + lipids	1.320,3	mg
long-chain fatty acids	5.579,7	mg
Omega-3 fatty acids	15,8	mg
Omega-6 fatty acids	908,4	mg
saturated fatty acids	2,3	g
Monounsaturated fatty acids	2,4	g
Polyunsaturated fatty acids	0,9	g

*Table 12: Nutritional table of fatty acids in pollen; source: dato Denkwerkzeuge, 2021.*

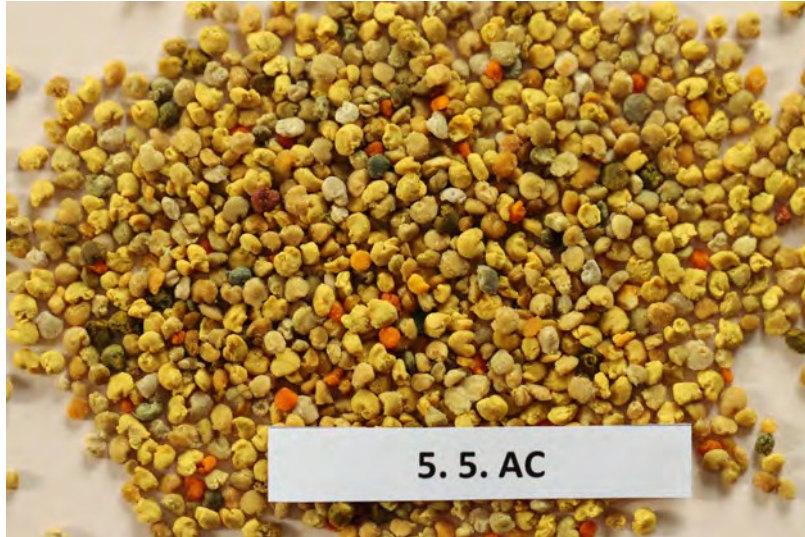
Important note from dato Thinking Tools:

This data is for personal information only. In any case, a reference to the source must be given. Commercial use is excluded without the written consent of dato Denkwerkzeuge.

## 19 Appendix- Documentation

### 19.1 Appendix I Images of collected and dried pollen

Development of pollen colours in **May, pollen apiary Donau Au** (Eferding)



*Photo 66: Pollen from the Donau Au (Eferding) on 5 May.*

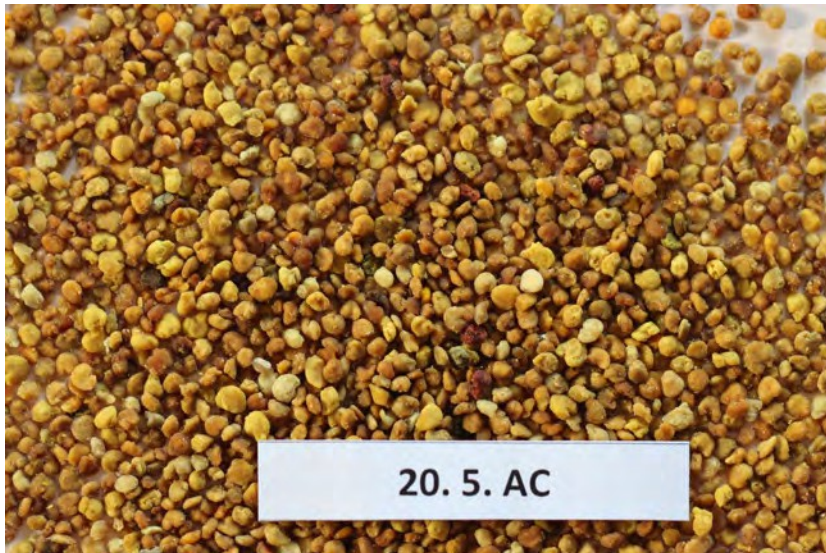


*Photo 67: Pollen from the 10th and 11 May from the Donau Au (Eferding).*



*Photo 68: Pollen from the Donau Au (Eferding) on 16 May.*





*Photo 69: Pollen from the Donau Au (Eferding) on 20 May.*



*Photo 70: Pollen from the Donau Au (Eferding) on 24 May.*



*Photo 71: Pollen from the 29th and 30 May from the Donau Au (Eferding).*



Comparison of daily harvests of **pollen apiaries Donau Au (Eferding)** and **Falkenstein (Mühlviertel)**, July

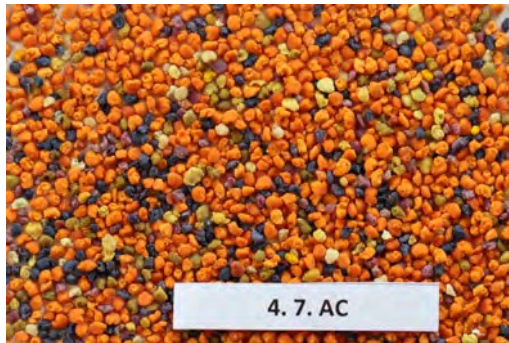


Photo 72: Pollen from the Donau Au (Eferding) on 4 July.



Photo 73: Pollen from Falkenstein (Mühlviertel) on 4 July.



Photo 74: Pollen from the Donau Au (Eferding) on 7 July.



Photo 75: Pollen from Falkenstein (Mühlviertel) on 7 July.



Photo 76: Pollen from the Donau Au (Eferding) on 8 July.



Photo 77: Pollen from Falkenstein (Mühlviertel) on 8 July.

Comparison of the **composite samples June and July** from **Donau Au** (Eferding) and **Falkenstein** (Mühlviertel)



*Photo 78: Mixed sample of the month of June; Donau Au (Eferding).*



*Photo 79: Mixed sample of the month of June; Falkenstein (Mühlviertel).*



*Photo 80: Mixed sample of the month of July; Donau Au (Eferding).*



*Photo 81: Mixed sample of the month of July; Falkenstein (Mühlviertel).*



## 19.2 Annex II Documentation of harvest quantities, moisture content, weather and scale-hive results

Table 13: Documentation of harvest quantities, moisture content, weather and scale-hive results.  
Pollen apiary Donau Au near Eferding: May.

Collection day	Fresh pollen gram	Dry pollen gram	Difference Moisture gram	% moisture in fresh pollen (1)	Weather, temperature at withdrawal (2)	Scale hive result (3)	Hives	Notes
04.05.2023	736	627	109	14,8	Warm, dry; 20°C	0,62	15	
05.05.2023	793	666	127	16,0	Warm, partly cloudy, dry, 22°C	1,23	15	
06.05.2023	1.015	767	248	24,4	Warm, partly cloudy, dry, 25°C	-0,45	15	
07.05.2023	973	766	207	21,3	Warm, partly cloudy, dry, 24°C	2,12	15	
08.05.2023	1.019	824	195	19,1	VM: cool, cloudy; NM: overcast; 17°C	0,85	15	
09.05.2023	1.017	803	214	21,0	Sunny, east wind, dry; 21°C	2,25	15	
10. and 11.5.2023	776	539	237	30,5	Cool, almost permanent Rain, high RH; 14°C; taken when raining	-0,08 -0,33	15	
12.05.2023	332	236	96	28,9	Cool, rain; high RH; 13°C	-0,2	15	
13.05.2023	3.433	2.731	702	20,5	Warm, cloudy, dry; 19°C	-1,85	15	
14.05.2023	675	460	215	31,9	Cool; VM: Rain; NM: Rain; 13°C	-0,34	15	
15.05.2023	1.938	1.340	598	30,9	Very cool, light rain again and again; 13°C	-0,06	15	
16.05.2023	37	26	11	29,7	Very cool, rain almost all day, hazy; 11°C	-0,35	15	
17.05.2023	None Withdrawal				Cold; VM: Rain; NM: covered;	-0,49	15	
17. and 18.5.2023	300	209	91	30,3	Cold, windy, overcast; 12°C	-0,32	15	
19.05.2023	4.169	3.104	1.065	25,6	Cloudy, dry; 19°C	0,87	15	
20.05.2023	2.281	1.697	584	25,6	Cloudy, sunny Sections, warm, windy, dry; 24°C	-0,1	15	
21.05.2023	1.781	1.388	393	22,1	Warm, sunny, dry, very windy; 24°C	0,17	15	
22.05.2023	1.359	1.107	252	18,5	Sunny, dry, warm; 27°C	-0,68	15	
23.05.2023	755	579	176	23,3	Cloudy, thundery showers, warm; 19°C	-0,14	15	
24.05.2023	1.300	1.027	273	21,0	Cloudy; partly sunny; 15°C;	-0,97	15	
25.05.2023	1.002	798	204	20,4	Warm, sunny, dry; 23°C	-0,43	15	
26.05.2023	1.046	840	206	19,7	Warm, sunny and Cloudy, dry; 23°C	-0,23	15	
27.05.2023	693	581	112	16,2	Warm, cloudless, dry; 21°C	-0,85	15	
28. 5.2023 (taken 29.5. 8.30 Clock)	601	488	113	18,8	Warm, cloudless, dry; 21°C	0,06	15	
29. and 30.5.2023	1.192	1.000	192	16,1	Warm, cloudless, dry; 23°C (both days)	1,13	15	
4.5. until 30.5.2023		<b>22.623</b>						

(1) Indicates the dried moisture percentage. Serves as an orientation value, as the drying time sometimes varies. Temperature is always 40°C.

(2) Description of the weather. Temperature at the time of collection of the collected pollen.

(3) Unfortunately, the scale colony was sub-optimally developed. This location is a pure early harvest site.



Table 14: Documentation of harvest quantities, moisture content, weather and scale-hive results.  
Pollen apiary Donau Au near Eferding: June and July.

	Fresh pollen gram	Dry pollen gram	Difference Moisture gram	% moisture in fresh pollen (1)	Weather, temperature at withdrawal (2)	Scale hive result (3)	Hives	Notes
12.06.2023	637	541	96	15,07	Warm, sunny, dry, East wind; 21°C	?	13	
13.06.2023	305	260	45	14,75	Warm, dry, sunny, very windy, east wind; 21°C	0,25	13	
14.06.2023	351	247	104	29,63	Warm, dry, sunny; hardly any wind; 23°C	0,18	13	
15.06.2023	325	265	60	18,46	Warm, dry, humid, hardly any wind; 25°C	-0,03	13	
16.6. and 17.6.2023	951	756	195	20,5	Both days: very warm, sunny, humid,	0,22	13	
18.06.2023	1.015	837	178	17,54	Hot, sunny, no wind, humid, no rain; 27°C	0,4	13	
19.06.2023	768	638	130	16,93	Hot, sunny, humid, no wind, no rain; 34°C	0,17	13	
20.06.2023	1.243	1.020	223	17,94	Hot, sunny, very humid, no rain; 36°C	0,31	13	70 minutes for cleaning
21.06.2023	1.525	1.241	284	18,62	Hot, sunny, very humid, no rain; 31°C	0,2	13	
22. and 23.6.2023	2.175	1.733	442	20,32	22.6: very hot, sunny, very humid, hardly any wind; 23.6: Very cool, overcast,	1,31 -0,46	13	
24.06.2023	1.250	961	289	23,12	VM: very cool, overcast, very windy; NM: hot, sunny, little wind; 32°C	-0,12	13	
25.06.2023	1.310	1.061	249	19,01	Hot, sunny, hardly Wind; 32°C	0,32	13	
26. and 27.6.2023	2.281	1.824	457	20,04	26/6: Hot, sunny, windy; 27.6:	0,61	13	
28. and 29.6.2023	1.921	1.592	320	16,66	28.6: warm, windy, sunny; 29.6.: hot,	-0,02 0,18	13	
30.6. and 1.7.2023	1.713	1.368	345	20,14	30 Jun: VM: warm, sunny; NM: overcast, warm; 1 Jul: VM: cool, overcast, NM: warm variable cloudy, light wind; 25°C	0,05 -0,85	13	
02.07.2023	709	567	142	20,03	VN: Cool, dry, very windy; NM: warm, dry, windy; 25°C	-0,75	13	
03.07.2023	832	701;	131	15,75	Warm, partly cloudy, very windy; 25°C	-0,27	13	Dried for 6 hours
04.07.2023	896	769	127	14,17	Warm, sunny and partly cloudy; light wind; 26°C	-0,12	13	
5. and 6.7.2023	1.322	1.091	231	17,47	5.7.: warm, changing Cloudy; very windy;	-0,09	13	6 hours dried
07.07.2023	686	607	79	11,52	Hot, sunny; light Wind; 30°C	-0,25	13	
08.07.2023	647	639	8	1,24	Hot, sunny, no wind; 32°C	0,24	13	5 hours dried
9. until 11.7.2023	2.053	1.737	316	15,39	Hot, sunny, very humid, no wind; 35°C	-0,36 -0,20 -0,16	13	Dried for 6.5 hours
12.6. until 11.7.2023		<b>19.754</b>						

(1) Indicates the dried moisture percentage. Serves as an orientation value, as the drying time sometimes varies. Temperature is always 40°C.

(2) Description of the weather. Temperature at the time of collection of the collected pollen. (3) Unfortunately, the scale colony was sub-optimally developed. This location is a pure early harvest site.

Table 15: Documentation of harvest quantities, moisture content, weather and scale-hive results. Pollen apiary Falkenstein, Mühlviertel: June.

Collection day	Fresh pollen gram	Dry pollen gram	Difference Moisture gram	% moisture in fresh pollen (1)	Weather, temperature at withdrawal (2)	Scale hive result	Hives	Notes
06.06.2023	80	62	18	22,5	Warm, cloudy, humid, no rain; 21°C	0,43	3	
07.06.2023	66	53	13	19,7	Warm, cloudy, humid, no rain; 23°C	1,34	3	
08.06.2023	58	49	9	15,52	VM: cloudy, warm, humid; NM: windy, short rain; 18°C	0,12	3	
09.06.2023	88	70	18	20,45	Cloudy, short rains; thundery; 21°C	0,5	3	
10. and 11.6.2023	245	203	42	17,14	Warm, cloudy, thundery; 18°C; Day 2: Warm, sunny with clouds, dry; 21°C	0,28 0,53	3	
12.06.2023	112	96	16	14,29	Warm, dry, east wind; 18°C	0,15	3	Fresh pollen incomplete captures
13.06.2023	138	117	21	15,22	Warm, dry, sunny, very windy, east wind; 18°C	0,33	3	
14.06.2023	150	128	22	14,67	Warm, sunny, dry, hardly any wind; 21°C	0,47	3	
15.06.2023	160	137	23	14,38	Warm, sunny, dry, hardly any wind; 23°C	0,85	3	
16. and 17.6.2023	335	170	165	49.25 (very strongly dried)	Warm, sunny, humid, short thundery rains; 22°C	0,67 1,04	3	
18.06.2023	379	246	133	35,09	Hot, sunny, no Rain, no wind; 22°C	1,16	3	
19.06.2023	210	178	32	15,24	Hot, sunny, rain in the morning, humid, no wind; 29°C	2,13	3	
20.06.2023	295	248	47	15,93	Hot, sunny, humid, no rain; 29°C	2,68	3	
21.06.2023	331	279	52	15,71	Hot, sunny, very humid, no rain; 26°C	2,84	3	
22. and 23.6.2023	426	352	74	17,37	22.6: hot, sunny, humid; no wind; 23.6.: very cool, overcast, heavy Wind; 20°C	3,36 0,5	3	
24.06.2023	180	145	35	19,44	VM: very cool, overcast, strong wind, no rain; NM: hot, sunny, hardly any wind; 22°C	1,31	3	
25.06.2023	161	139	22	13,67	Hot, sunny, hardly Wind; 29°C	1,59	3	
26. and 27.6.2023	236	203	33	13,98	26.6: Hot. Sunny, windy; 27.6.: VM cool, overcast, very windy; NM: warm, overcast, very windy; 21°C	2,27 0,45	3	
28.6. and 29.6.2023	154	135	19	12,34	28.6: warm, sunny and rainy, windy; 29 Jun: hot, little Wind; 26°C	1,22 2,14	3	
30.6. and 1.7.2023	198	166	32	16,16	30 Jun: VM: sunny, warm, little wind; NM: cloudy, cool, windy; 1 Jul: VM: cool, overcast, light windy; NM: warm, changeable cloudy; 21°C	3,03 1,36	3	
6.6. until 1.7.2023		<b>3.176</b>						

(1) Indicates the dried moisture percentage. Serves as an orientation value, as the drying time is partly  
(2) Description of the weather. Temperature at the time of collection of the collected pollen.

Table 16: Documentation of harvest quantities, moisture content, weather and scale-hive results. Pollen apiary Falkenstein, Mühlviertel: July.

Collection day	Fresh pollen gram	Dry pollen gram	Difference Moisture gram	% moisture in fresh pollen (1)	Weather, temperature at withdrawal (2)	Scale hive result	Hives	Notes
02.07.2023	82	68	14	17,07	VM: cool, dry, very windy; NM: warm, cloudy, very windy; 20°C	2,07	3	
03.07.2023	88	75	13	14,77	Warm, partly cloudy, very windy; 21°C	1,87	3	Dried for 6 hrs
04.07.2023	103	89	14	13,59	Warm, sunny, partly cloudy; light wind; 21°C	2,11	3	Dried for 6 hrs
5.7. and 6.7.2023	152	130	22	14,47	5.7: warm, partly cloudy; very windy; 6.7: warm, partly cloudy, light rain. Wind;	1,27 0,78	3	
07.07.2023	47	43	4	8,51	Hot, sunny, light wind; 29°C	0,77	3	5 hours dried
08.07.2023	54	49	5	9,26	every day: hot, sunny, no wind; 33°C	0,33	3	Dried for 5 hours
9. until 11.7.2023	175	156	19	10,86	Hot, sunny, no wind; 33°C	0,23 0,15 0,67	3	Dried for 5 hours
2.7. until 11.7.2023		<b>610</b>						

(1) Indicates the dried moisture percentage. Serves as an orientation value, since the drying duration

(2) Description of the weather. Temperature at the time of collection of the collected pollen.

Table 17: Annual harvest amounts in grams of the pollen apiaries Donau Au and Falkenstein.

Pollen location	May <sup>(1)</sup>		June <sup>(2)</sup>		July <sup>(3)</sup>	
	Pollen fresh	Pollen dry	Pollen fresh	Pollen dry	Pollen fresh	Pollen dry
Donau Au, Eferding	29.223	22.623	17.770	14.344	7.145	5.410
Falkenstein, Mühlviertel	-	-	4.002	3.176	701	610

(1) 4 May to 30 May (15 colonies)

(2) Donau Au: 12 June to 1 July (13 colonies); Falkenstein: 6 June to 1 July (3 colonies)

(3) 2 July to 11 July (13 or 3 colonies)



### 19.3 Annex III Results of the cleaning of the daily harvests

Table 18: Results of the cleaning of the daily harvests (selection from the pollen apiary Donau Au, Eferding).

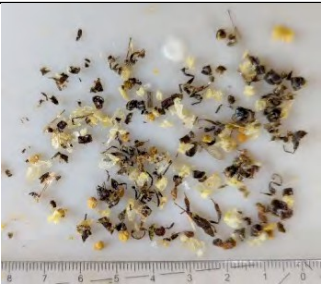











Location	Collection period	Contained in grams dry pollen	Image with contamination
Donau Au near Eferding	5. and 6.5.2023	1.433	
	Pollen trap placed underneath on 4.5.; colonies worked through; honey supers placed on top.		
	13.05.2023	2.731	
	28.05.2023	488	
	On this day all colonies were worked through; swarm control, drone comb cut; no new honey supers.		
	25.06.2023	1.061	
	03.07.2023	701	
5. and 6.7.2023	1.091		

Table 19: Results of cleaning the daily harvests (selection of pollen apiary Falkenstein, Mühlviertel).

Location	Collection period	Contained in grams dry pollen	Image with contamination
Falkenstein, Mühlviertel	13.06.2023	260	
	22. and 23.6.2023	352	
	25.06.2023	139	
	30.6. and 1.7.2023 after cutting drone brood	166	
	03.07.2023	75	
	5. and 6.7.023	130	

## 19.4 Annex IV Abbreviations

Table 20: Abbreviations (alphabetical).

°C	Degree Celsius
CAD	Computer aided design
cm	Centimetre
DeBiMo	German Bee Monitoring
DRD	Dietary Reference Data (reference values for nutrient intake)
EFSA	European Food Safety Authority
g	Gram
kcal	Kilocalorie
kg	Kilogram
kJ	Kilojoule
LMIV	Food Information Regulation
mg	Milligram
mm	Millimetre
µg	Microgram
MOE	Margin of Exposure
VAT	Value added tax
PA	Pyrrolizidine alkaloid
PPP	Plant protection products
Std.	Hour(s)



## 20 Literature

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## 23 The author



The author started beekeeping in 1979. As a consultant in grassland farming and as a master beekeeper, he has gained a high level of recognition beyond Austria in over 40 years with numerous lectures and publications on bees, biodiversity, climate change and meadow farming. With his comprehensible and practical way of writing, he has also secured a large readership as a book author. New findings and innovations from research projects and his many practical trials have found their way into agricultural production.

Peter Frühwirth, born in 1958, is a graduate of the University of Natural Resources and Life Sciences, Vienna, and has lived in the Upper Mühlviertel since 1999, where he runs an organic commercial beekeeping business with his family.





**NOTES:**



**NOTES:**





# Highland Pollen Trap

Idea & Design



Costume made by

