



C.S.I. Pollen: How to investigate pollen diversity available for honey bees

1. Choose 3 colonies for study.

Ideally you should choose: non migratory colonies, all in the same apiary. Give numbers 1-3 to the colonies; preferably always sample the same colonies. Get three jam jars and label the jars and the lids with "1", "2", "3". See below for details of jars.



2. Install pollen traps.

Note that the bees need to get used to the pollen trap for some days before use and the traps need to fit exactly (if there are any gaps the bees will find these and avoid using the trap as intended).

3. Close pollen traps before sampling date.

You will receive an email a few days before the target sampling date. The pollen traps should preferably be closed for 24 hours within the suggested sampling period (Thursday to Sunday). Line the tray with a clean paper towel. Pollen traps can be closed for up to 3 fair days if personal circumstances demand it. Please note how long the pollen traps were closed for (see 9.3). Pollen collected in "Fairweather" traps during wet weather will be unusable.



4. Collect content of pollen trap.

Ideally after the trap has been closed for 24 hours, collect the pollen in a labelled jar or analyse at the apiary. Remove paper towel and tip the contents into the jar. Do not mix up the pollen collected from the 3 different colonies!



5. Open pollen trap after collecting samples.

To ensure sufficient pollen collection for the colonies to use, do not keep pollen traps closed longer than needed.

6. Determine amount for colour analysis.

We do not need the whole amount of pollen in the trap. About 20 grams per colony are analysed. This is the amount that fits in an inverted jar lid (which should be a TO-63 “Twist Off” lid, diameter ca. 63 mm, height 8.5 mm – NB a standard honey jar lid is too large, but TO-63 lids are very commonly used for jam jars, and a jar that the lid fits is very convenient for collecting the trap contents). Mix the trap contents by shaking the jar, and then fill the lid level with its top. This is the sample that will be used. If there is not enough pollen to fill the lid, please make a note and then enter this later (see 9.6): “The required amount was not reached (less pollen than an inverted jar lid)”.



7. Determine number of colours of pollen pellets.

We are interested in the number of different coloured pollen loads in the 20 g sample. Therefore sort the pollen pellets into different colours on white paper or a white tray (e.g. using a match), preferably during daylight, but not in direct sunshine.



Classification of number of pollen loads per colour is as follows:

ABUNDANT colours in the sample (>20 pollen pellets)

RARE colours in the sample (3-20 pollen pellets)

VERY RARE colours in the sample (1-2 pollen pellets)

A typical result could therefore look like this:

Colony 1: The required amount (full inverted jar lid) was reached.

1 VERY RARE colour in the sample,

2 RARE colours in the sample,

2 ABUNDANT colours in the sample.

Colony 2: The required amount was not reached (less pollen than an inverted jar lid).

0 (zero) VERY RARE colour in the sample,

7 RARE colours in the sample,

1 ABUNDANT colour in the sample.

Colony 3: The required amount (full inverted jar lid) was reached.

0 (zero) VERY RARE colour in the sample,

1 RARE colour in the sample,

4 ABUNDANT colours in the sample.

Note that a remarkable number of people have difficulties with colour vision. If you know that this affects you, please get help from a pollen counter with good colour vision. We will therefore also place a colour vision test on our website so that you can check this if you are not sure.

The steps above complete the work to be done for Level 1 analysis of the pollen.

8. Use for the pollen.

Level 2 analysis, if it is possible, will involve storing the 20 gram samples in a freezer in individual labelled polythene bags which will be supplied. These will be posted to the investigating lab at the end of the season, following instructions that will be issued at the time.

You can use any surplus pollen as you wish: eat it yourself, discard it, or feed the pollen to colonies as a patty (water plus icing sugar). But note that diseases might be spread when feeding pollen to other colonies than the one from which the sample was collected.



9. Data entry.

With every invitation to collect samples you will be sent by email a unique internet link that can only be used once and will be active for 2-3 weeks. If you have any problems contact: magnus.peterson@strath.ac.uk . The proposed sample collection periods for 2014 begin on 3 April, 24 April, 15 May, 5 June, 26 June, 17 July, 7 Aug, 28 Aug, 18 Sept: If you do not receive an invitation email a few days before each of these dates, please check your spam box or contact the national coordinator. On the data collection website, you will be asked the following:

9.1. Please choose your country

For volunteers in Scotland this will be "Scotland".

9.2. On which date did you collect your samples from the traps?

9.3. How many days were the pollen traps closed? (1, 2, 3, more days)

9.4. Where are your monitoring colonies located? Please specify exact location!

Note: Zoom in and out to find the location of your apiary. Determine the location with a right mouse click! Switch to Satellite-



mode to identify the location! From this we can determine the GPS coordinates and sea level of your apiary. For example, in the picture you can see the trees underneath which the colonies from Graz University are located. Your data will be used for scientific purposes / research only. No other party will be informed about your personal data.

9.5. How would you characterize your Apiary location within 2km radius?

Possible answers: Arable, Urban, Village, Grassland, Heathland / Moorland, Salt marsh, deciduous woodland = broad-leaved forest, coniferous woodland, mixed forest, Riparian forest.

Note: 9.4 and 9.5 allow comparison of different habitats, and will not be asked at every sampling date.

9.6. What amount of pollen pellets have you analysed from colony 1?

Possible answers: I did not collect pollen from this colony / The required amount (full inverted jar lid) was reached / The required amount was not reached (less pollen than an inverted jar lid)

9.7. How many different pollen colours did you identify in the sample from colony 1?

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	More than 15	No answer
Abundant colours (>20 pollen pellets)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Rare colours (3-20 pollen pellets)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Very rare colours (1-2 pollen pellets)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

A similar response will be required for the other two colonies.

9.8. What is the total number of different pollen colours from all of the three colonies?

This allows us to learn about the pollen availability of your location. We therefore add the number of “new” colours from the samples from colonies 2 and 3 to the number of colours in the sample of colony 1. One Example: We find 5 colours of pollen loads in the sample from colony 1 (white, bright yellow, dark yellow, brown, blue). The first four colours can also be found in the sample from colony 2, but additionally we find orange pollen loads. So we have 6 different colours in total from the two colonies. In the sample from colony 3 we find colours that we have already seen in the previous samples, but also grey pollen loads that we have not seen before. Hence, the total number of different pollen load colours on this location is: 7 (although in every single colony sample there were 5 different pollen colours identified).

10. Confirmation email.

After you have successfully transmitted your results, you will within a few minutes receive a confirmation email. If you did not transmit your results, you will get a reminder email.

Contact email address of the Scottish national coordinator:

magnus.peterson@strath.ac.uk